

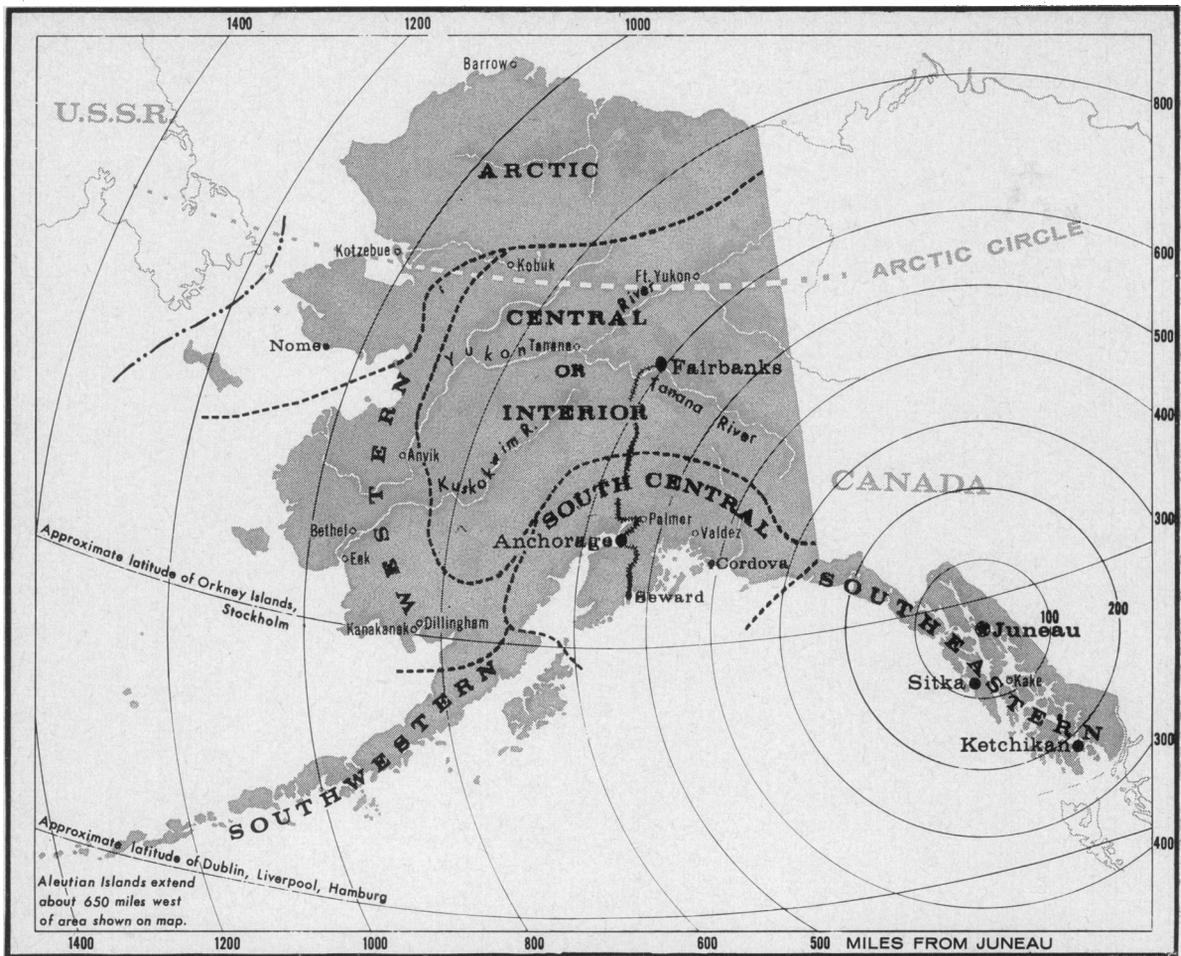


Chugach Mountains near Anchorage

Photograph by J. Malcolm Greany, Juneau

ALASKA

**frontier
for
health
services**



ALASKA is in a particularly critical period. The transition from Territory to State presents complex tasks of organization to be accomplished with as little disturbance of functions as is humanly possible. New sources of revenue are to be tapped. New programs are to be initiated. Established services, formerly provided by Federal agencies, are passing to the State.

Alaska is in many respects still a frontier, undergoing settlement and early growth. A large segment of the population is moving from a primitive hunter's culture to the culture of the nuclear age almost in a single generation. Another segment is composed of transient military personnel and their dependents. The remainder is a complex of established settlers, newcomers, and seasonal workers, with multiplying demands for public services.

A review of Alaska's health at this juncture seems timely.

To readers of *Public Health Reports*, Alaska may suggest that we have under the American flag a unique opportunity for technical assistance to an underdeveloped land. Its challenge to health services opens rare opportunities for research and application of present knowledge.

An even higher consideration is that which motivated Dr. Joseph Mountin (1) and others to advocate the establishment of an Arctic Health Research Center:

"In the past, public health activities have developed in the wake of civilization. Now public health is presented with an opportunity to lead civilization, to pioneer in new fields. By uncovering some of the problems of human life and adjustment in low temperature areas, public health can become a creative force in opening up new frontiers. At the same time, it can make potentially significant contributions to basic knowledge."

The successful development of Alaska as a home and as a resource for a democratic people depends on what is done to promote the health and vigor of all who live and work there, for this generation and generations to come. It is with this thought above all that the following pages consider the status and development of health in Alaska, the largest and the least developed of the 50 States.

Geography and Climate

From the standpoint of medicine and public health, the most important features of the Alaskan environment are those which influence travel and transportation, communication, construction, and environmental sanitation. Health services in Alaska range over thousands of miles: through climates ranging from the arctic to temperate; from arid to rainy; over glacier, muskeg, volcano, fiord, forest, and frozen plain. Isolated from the main centers of health resources in the United States, Alaskan health services nevertheless bring modern methods to still more isolated settlements, which subsist by hunting, fishing, logging, mining, or herding.

Thanks to aviation and radio, Alaska has succeeded in bypassing many of the physical obstacles of its geography and climate, which formerly made travel hazardous and time consuming and communication uncertain if not impossible. The long distances between settlements, the high mountain ranges, and the expanses of treeless and trackless tundra are no longer as formidable as in years past. In all but the most remote areas, the bush plane is replacing the dog team as the customary means of winter travel for all Alaskans.

All Alaskan bush flights are "WPPW," "weather permitting-pilot willing." For some flights, the plane may take off on wheels and land on pontoons. It may land on a gravel bar in a river, or on frozen tundra, or on a slough or lake. During the fall freezeup and spring breakup travel to outlying areas generally comes to a halt for a few weeks until ground and water conditions stabilize. Construction of additional airfields with surfaced or graveled runways is overcoming the seasonal hiatus, but in remote areas the possibility of seasonal de-

lays from freezing or thawing conditions persists.

The Alaskan bush pilot is often the first to bring back word of outbreaks of disease, food shortages, forest fires, or other disaster. He goes out of his way to check on isolated individuals and to fly in critically needed personnel, food, drugs, or equipment. Between the weekly or biweekly bush flights, dogsleds are usually the only means of winter travel between villages. A few river settlements operate trucks, caterpillar tractors, or snowmobiles on frozen rivers during the winter. A few "Snogoes" (sleds with airplane propellers mounted on the rear) are also used.

In summer, boats with outboard motors travel along the swift, silt-laden streams, through many deltas and sloughs. It takes a skilled navigator to find his way, because the streams may change course from season to season. Kayaks, one-manned, and umiaks, large skin boats, are used by coastal residents for sealing and walrus hunting.

Umiaks, frequently equipped with outboard motors, lighter freight in from the big ships lying offshore along the northwestern coast.

Microwave transmission of long-distance telephone calls, broadcasts, and shortwave radio have speeded up messages. The Army Signal Corps operates the telegraph and long-distance systems in Alaska. Exchanges which only a

Data and information on which this report is based were obtained from both published and unpublished reports and records and by personal interviews or communications with staff members of State and Federal agencies and organizations. The State agencies were the Alaska Agricultural Experiment Station and the Alaska Department of Health and Welfare. Federal agencies, all within the Public Health Service, were the area office and Public Health Service Hospital, Anchorage, and the field office, Mount Edgecumbe, both of the Alaska Native Health Service, Division of Indian Health, Bureau of Medical Services, and the Arctic Health Research Center, Bureau of State Services. Statistical data are the most recent figures available as of May 1960. Mrs. Rachel Simmet, special assistant to the director, Arctic Health Research Center, Anchorage, was principally responsible for the acquisition, compilation, and presentation of this information.

few years ago required days or weeks are completed in minutes or, at most, hours. For example, in a few minutes a public health field nurse may learn that a hospital bed is available for a patient waiting in Sleetmute, and the patient may be brought to the hospital, weather permitting, within a few hours or a few days. Regular longwave broadcasts also carry personal messages which might otherwise be delayed.

Physicians at field hospitals hold regular daily conferences by radio, answering questions and giving instructions for teachers, missionaries, and village leaders.

Alaska's highway and railway facilities, access roads, and airfields are being extended in anticipation of population needs. Present systems of travel and communication in general demonstrate high achievements against extreme odds.

Actually, there are only two phenomena which are truly peculiar to northern regions. Extremely low temperatures, invariably regarded as the outstanding feature of Alaska, also occur in many of the northern States lying along the Canadian border. But permafrost and extreme periods of darkness and light occur only in the arctic and subarctic. Permafrost, a major obstacle to Alaskan development despite years of study and experiment, is the layer of permanently frozen ground which underlies a considerable portion of all land masses bordering on the Arctic Ocean. About 60 percent of Alaska's 586,000 square miles is underlaid by this frozen layer. This frozen earth is hard to excavate, and once thawed on the surface there is no drainage through the frozen layer beneath. Wells and sewer or water pipes running through the permafrost will freeze unless special precautions are taken. The foundations of highways and buildings often settle or heave as a result of disturbances in the permafrost. Other specific effects of permafrost are discussed below.

The second environmental factor peculiar to northern latitudes is the light cycle which gives Alaska its long summer days and long winter nights. While the specific effects of protracted light or darkness on human beings have been investigated only to a limited extent, there has

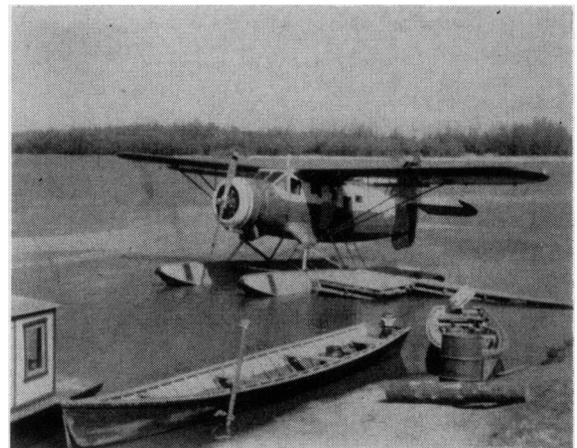
been considerable speculation concerning the relation of the long nights to mental health. A condition popularly known as "cabin fever" is sometimes ascribed by amateur Alaskan psychologists to the period of winter darkness, but no scientific evidence has been assembled to support or contradict this theory. Studies are underway to determine the effects of the protracted length of summer days on certain public health procedures, such as the operation of sewage oxidation ponds.

Population

In general composition as well as in the more specific characteristics of age, heredity, sex, geographic distribution, and mobility, the Alaskan population is in a class by itself. For this reason, comparison of Alaskan data with data for other States or for the United States as a whole, while inevitable, is unlikely to lead to sound conclusions unless Alaska's unique population and environment are also evaluated.

Certain basic characteristics of the general Alaskan population have had special bearing on health and medical care programs.

The presence of aboriginal groups in varying stages of acculturation and economic independence, for example, has encouraged Federal fi-



Float plane on Yukon River at Anvik. River boats and float planes both use Alaska's waterways. When waterways are frozen, dog teams travel on them and ski planes land on them. Itinerant public health nurses, sanitarians, and clinic personnel, as well as patients going to and from hospitals, must "make connections" between small and large craft.



Bureau of Indian Affairs school and village of Noorvik on the Kobuk River in far northern Alaska. In background is part of the vast "Arctic bog," which explains why travel in Alaska is by air, river boat, or dogsled.

nancing of medical care and facilities for such Alaskans. With establishment of parallel services and facilities for other residents, administrative functions in many instances have overlapped in the past.

The word "native" is used in the following pages to designate members of the three aboriginal groups in Alaska as differentiated from individuals born in Alaska of nonaboriginal parents. The term "white" as used in Alaskan data includes a small number of American Negroes and Filipinos as well as Alaska-born white residents and immigrants.

The native population includes an estimated 18,000 Eskimos, 16,000 Indians, and 4,000 Aleuts. The Eskimos, unlike the Indians, have no tribal or clan organization and are generally classified as coastal or inland Eskimos, or by the name of the specific area which they inhabit, such as Brooks Range, Bering Sea, or Pacific Eskimos.

The Indians of southeastern Alaska comprise three tribal groups: Tsimshian, Tlingit, and Haida. Indians of interior Alaska belong to the Athabaskan, or Athapascan, tribe, with subsidiary groups also designated by location, as, for example, Copper River or Koyukon (Koyukuk and Yukon Rivers) Indians.

The Aleuts, smallest of the three aboriginal groups, are found chiefly in villages of the Alaska Peninsula and the Aleutian Chain.

Alaska has many excellent native artists and craftsmen. Years of dependence on their environment for a livelihood have made them expert observers and reporters of Alaskan natural history and wildlife, with remarkably accurate memories. They have proved to be excellent mechanics, pilots, and scouts, and have made notable contributions to the national defense through service in the Armed Forces, with the Alaska National Guard, and as construction workers on the DEW (distant early warning)

line and White Alice (communications network) installations in remote areas. Nine of the 60 members of the first State Legislature were natives: 6 were Eskimo, 2 Indian, and 1 Aleut. An Eskimo was also elected president of the first State Senate.

For many years now, a high proportion of the wage earners in Alaska have been Federal employees, both military and civilian. This has had considerable influence on local and state-wide health programs. Most of the health and medical needs of the individual military man and his dependents are met by services and facilities available only to the military population. Some of the Federal agencies, such as the Alaska Railroad and the Federal Aviation Agency (formerly Civil Aeronautics Administration) have had their own staff physicians. The Alaska Railroad also maintained a separate hospital for many years. Exclusion of these groups has limited the base of financial support for community facilities and services, and has upset the population ratios used in determining per capita needs and financial resources.

The bulk of the Alaskan population is still made up largely of "transplants," those who were not born in Alaska. The backgrounds of these immigrants, the reasons they have migrated north, and the levels of individual capability, emotional maturity, and resourcefulness which they represent profoundly influence the "tone" and development of the communities in which they settle. The get-rich-and-get-out-quick fortune seeker, who comes north without his family, is content with minimum comforts, contributes little to the stability of any community, and frequently aggravates conventional community problems. The individual who migrates north to "get away from it all" seldom contributes to Alaska's development. Fortunately, the proportion of fortune seekers and escapist among the annual swarm of newcomers is decreasing.

Age and Sex

Perhaps the most outstanding characteristic of the Alaskan population is its youth. According to a special 1959 Census Bureau compilation, the median age of the civilian population in Alaska is 18.5 years, while the median

age for the United States population as a whole is 30.1. Conversely, Alaska has the smallest number of "senior citizens" of all the 50 States, with only 4.4 percent of the population in the 65 and over age group. This unusual age distribution is important in interpreting mortality and morbidity statistics and in judging the health and medical care needs of Alaskans.

The ratio of males to females in the Alaskan population has decreased in recent years. In 1950, the ratio was down to 162 males per 100 females and has decreased more since then. A large proportion of women are of childbearing age, and the high birth rate is responsible in large measure for the increase in Alaska's population.

Geographic Distribution

Fewer than a quarter million people reside in Alaska. By comparison, Scandinavia and Finland, which closely resemble Alaska in extent and to a considerable degree in climate, had a total estimated population of nearly 19 million in 1957-58 (2).

Most of Alaska's present population is concentrated in the vicinity of the four major cities, Ketchikan, Juneau, Anchorage, and Fairbanks, in many small towns and villages along the Pacific, Bering, and Arctic seacoasts, and along the two main rivers, the Yukon and the Kuskokwim.

Alaska has the lowest population density of all the States, with about one person to each 3 square miles. Even with continued growth, such as the 51 percent increase in civilian population between 1950 and 1957, it seems likely that the present pattern of population distribution in Alaska will persist, with the highest concentrations along the temperate coastline and in certain sections of interior valleys.

The 38,000 Indians and Eskimos for the most part live in small, widely dispersed settlements, following early cultural patterns of location and occupation, while newcomers (cheechakos) favor the towns. This basic pattern of distribution has been modified to some extent by technological and cultural changes. As the wildlife resources have dwindled, many native hunters and fishers have migrated to larger communities in search of wage labor. Until

comparatively recent times, the only non-native residents in most of the small coastal and river villages were school teachers, missionaries, traders, or U.S. commissioners. With the expansion of defense construction activities and establishment of Federal Aviation Agency facilities in outlying areas, more and more cheechakos have moved into remote areas. Even in the most isolated regions, there are now few entirely native villages, and in the majority of the settlements most of the native residents, except perhaps the elders, understand and speak English in addition to their own language. Few of the newcomers, in contrast, have succeeded in mastering the Eskimo and Indian dialects.

The rate of acculturation among native groups has varied with geographic location. The ease and speed of cultural transition have been determined largely by the extent of exposure to the white man's industrial culture. Thus, among the Indians of southeastern Alaska, the process of acculturation has taken place far more rapidly and more thoroughly than among the Eskimos living along the Bering Sea and the Arctic Ocean. The transition from subsistence fishing of the early southeastern Indians to employment in commercial fisheries has been far easier than the changes implied for the Eskimo's shift from hunting seal or walrus to dependence on limited opportunities for unskilled wage labor in northwest Alaska (3).

Despite the lack of highway and railroad facilities, the Alaskan population is unusually mobile. Seasonal fluctuations in employment in the construction and fishing industries account for much of the traffic between Alaska and other States. There is also considerable population movement within Alaska. In former years, the entire population of many villages customarily moved in season, to summer fishing camps in the spring, to muskrat camps in the fall, or along the winter trail of the caribou herds. Seasonal shifts have decreased to some extent in recent years. As improvements in construction methods have extended the building season, more and more construction workers remain in Alaska the year around. Similarly, as schools and post offices are constructed in outlying vil-

lages, nomadic families are less inclined to move away from these fixed facilities. The tendency to "stay put," however, increases the need for sanitation and disease control, and for some formerly nomadic families it has meant limited supplies of food.

Health and Medical Resources

As in other sparsely settled areas, most of Alaska's health and medical facilities and personnel are located in or near major population centers. This distribution pattern is modified in Alaska by the fact that certain facilities were established specifically to serve the Eskimo, Indian, and Aleut population.

Alaska currently has 28 hospitals and 1 nursing home (table 1), 27 health centers, and roughly about 1,500 to 1,800 professional medical and paramedical personnel, including government and private but excluding military employees, to care for the health and medical needs of approximately 175,000 civilians. In general, per capita ratios of hospital beds and professional personnel are relatively low, and

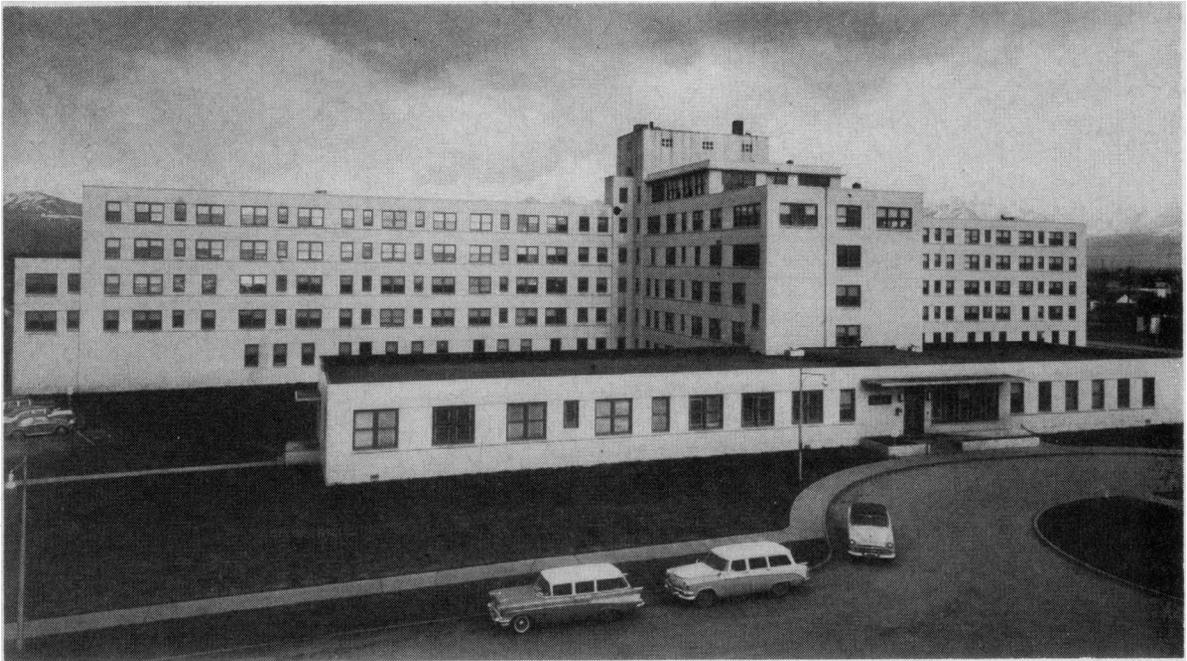
Table 1. Alaskan medical facilities, by type and bed capacity, 1959-60

Type of facility	Number	Bed capacity
Federal Government: ¹		
Public Health Service:		
Referral hospitals.....	2	700
Field hospitals.....	5	180
Outpatient clinics.....	(3)	-----
Fish and Wildlife Service hospitals ²	2	14
Total.....	9	894
Nongovernment:		
Church:		
General hospitals.....	9	381
Chronic disease hospitals.....	1	16
Community general hospitals.....	8	137
Other:		
White Pass and Yukon Hospital ³	1	8
Private nursing home.....	1	15
Total.....	20	557
Grand total.....	29	1,451

¹ Excluding military hospitals.

² Hospitals in Pribilof Islands are staffed by the Public Health Service and operated by the Fish and Wildlife Service.

³ Railroad.



Alaska Native Health Service Hospital, Anchorage

the distribution of these resources among population groups is somewhat uneven. There are, however, certain factors which offset these apparent deficiencies. One is the unusual age distribution. The population is, on the whole, young and healthy. Second, many Alaskans are still inclined to go "outside" for major surgery or for treatment of long-term illnesses. But the demand for specialized services and facilities located within Alaska is increasing.

Statistical analysis of health and medical resources in Alaska is difficult, because agency functions tend to overlap, and staffing patterns of government agencies vary. As a result of changes brought about by statehood, the general organization and relationships of Federal and State health agencies in Alaska are in a state of transition. The two chief agencies concerned with civilian health are the Division of Health of the Alaska Department of Health and Welfare and the Public Health Service including both the Alaska Native Health Service and the Arctic Health Research Center.

None of the military medical and health resources in Alaska is included in the analysis, since these are available to the general public on an emergency basis only. Special mention should be made, however, of auxiliary services

provided by the Alaska Air National Guard, Civil Air Patrol, Coast Guard, Air Force, and Navy, which are frequently called on for aid in searching for downed military and civilian aircraft, to provide emergency transportation for ill or injured residents, or to transport medical and nursing personnel in case of emergency.

Federal Government Facilities

The Public Health Service, in addition to providing medical care for Alaska's natives, has pioneered in studying Alaska's health needs through the Arctic Health Research Center, Bureau of State Services, in cooperation with the Division of Health, Alaska Department of Health and Welfare, and other agencies and organizations in and outside Alaska.

The Public Health Service's Bureau of Medical Services, through its Division of Indian Health, is the unit of Federal Government responsible for providing medical care for the Eskimos, Indians, and Aleuts of Alaska. The activities of the Alaska Native Health Service program of the Division of Indian Health are under the administrative supervision of the area office located at the ANHS hospital in Anchorage. A field health office at the Mount Edge-

cumbe hospital directs the program in south-eastern Alaska.

Under the immediate supervision of the Mount Edgecumbe field health office is the 300-bed hospital at Mount Edgecumbe near Sitka, and an outpatient clinic at St. Ann's Hospital in Juneau. Under the Anchorage area office are a 400-bed hospital in Anchorage, five field hospitals distributed throughout northern, western, and central Alaska, and two hospitals operated by the Fish and Wildlife Service on the Pribilof Islands.

In addition to supervising the operation of the hospital at Anchorage and the five field hospitals, the Anchorage area office has a staff of program specialists who direct a comprehensive program related to their individual fields, as well as acting as consultants to Public Health Service field personnel and installations. Through joint effort with the Division of Health, Alaska Department of Health and Welfare, the area office is providing public health nursing and sanitation aide services to native villages under contractual arrangements. The State tuberculosis control program is also jointly supported by the Alaska Native Health Service of the Division of Indian Health, by provision of monetary aid and by direct support of two of the three airborne chest X-ray survey teams serving the State.

The Mount Edgecumbe field health office supervises school health programs at the Mount Edgecumbe School, the only native boarding high school in Alaska, and at Wrangell Institute, a boarding school covering grades 1-8, to which native children are sent from remote villages where no schools are available at present.

Although tuberculosis among the Alaskan natives has been drastically reduced (see table 7), thus diminishing the need for tuberculosis beds, the increased number of patients who need medical and pediatric beds is more than enough to occupy existing hospital facilities, as well as facilities to be replaced at Kotzebue and Barrow. The changing trend from relatively inexpensive long-term care of tuberculosis patients to care of patients with acute general medical and surgical conditions poses several problems. Among these are the fact that a general hospital requires more personnel of more types than a tuberculosis hospital, the cost of transporting

the increased number of patients served by a general hospital, and remodeling of facilities.

In order to meet the objective of the Division of Indian Health to elevate the health status of the Alaskan natives to a level comparable with that of the general population of the State, other facilities, such as field health clinics, are also needed. Some field health clinics are already being held by Public Health Service doctors and public health nurses in schools and other temporary quarters in some of the villages; however, no fixed installations are available in many of the smaller villages. The plan is gradually to establish permanent facilities in strategically located areas so that more preventive as well as direct medical care can be made available to the beneficiaries. Fort Yukon will probably have the first such establishment in Alaska.

It has been frequently suggested that Public Health Service field hospitals be open to non-native residents of Alaska, particularly in communities where no other facilities are available. Hospital and outpatient medical and dental care are currently provided in emergency situations only. These non-native patients are requested to reimburse the Public Health Service for the care received, under set scheduled fees or at hospital cost-per-diem rates. This method of operation has been approved by the Alaska State Medical and Dental Associations as well as the Alaska Hospital Association.

Research in Alaska by the Public Health Service is primarily concerned with investigating and, where possible, devising solutions to the many and varied health and medical problems peculiar to the region. This program, conducted by the Bureau of State Services' Arctic Health Research Center at Anchorage, was established by act of Congress in 1948. Initiation of the research program was recommended by two survey teams from the American Medical Association which visited Alaska in 1946 and 1947, with strong endorsement from the Territorial department of health and other Territorial and Federal agencies concerned with Alaska's health.

The Arctic Health Research Center is the only research facility in Alaska with a resident staff devoting full time to health studies. Long- and short-term studies involving field and labora-

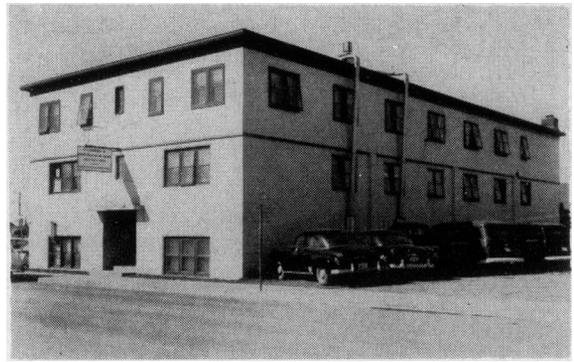
tory investigations in biochemistry and nutrition, entomology, environmental sanitation, epidemiology, physiology, and zoonotic disease are in progress at AHRC. Many of the study projects are pursued in cooperation with the Division of Indian Health, the Alaska Native Health Service, and the Alaska Division of Health. Direct support is provided for investigations in environmental sanitation and epidemiology by the Division of Indian Health. The National Institutes of Health provides partial support for studies in certain fields.

State Government Facilities

The Division of Health of the Alaska Department of Health and Welfare maintains 27 health centers, which constitute the front line of its health activities. Located in small villages as well as urban communities, these centers serve as headquarters for nursing and sanitation personnel between visits to outlying villages. The visits by public health nurses and sanitarians constitute the most arduous and critical health services in Alaska. As noted above, travel conditions are often trying. Accommodations in bush planes are so restricted that passenger size becomes a critical factor in recruiting field personnel.

Since many villages are remote from a field hospital, nurses during their visits often provide emergency aid in addition to routine services. Although housing facilities are being improved, it is not unusual for a visiting nurse or other field visitor to bed down in a sleeping bag on the floor of the school house or trading post.

Many of the health centers and itinerant nursing services were established several years ago by the Office of Indian Affairs, Department of the Interior, as extensions of the field hospitals, primarily for native beneficiaries. As rapidly as finances permit, the Alaska Division of Health is taking over these units and is adding new ones, to provide services for all residents of as many villages as possible. As the health centers and itinerant services are transferred to the Alaska Division of Health, the Public Health Service Division of Indian Health continues to finance the itinerant nursing and sanitation programs on a contractual basis.



Main laboratory building, Arctic Health Research Center, Anchorage



Health center, Kake, June 1958. This health center provided the first adequate quarters for itinerant nurses in this southeastern Alaska village.

Federal funds have been appropriated for construction of a 225-bed State mental hospital at Anchorage, and additional funds have been allocated by the State Legislature for conversion of existing hospital facilities at Valdez for care of custodial mental patients.

The Alaska Division of Health maintains four laboratories, a central laboratory at Juneau and three regional laboratories at Ketchikan, Anchorage, and Fairbanks. The four units provide comprehensive, modern public health laboratory services for the entire area of Alaska. Jointly they supply the bacteriological, serologic, parasitological, radiological surveillance, sanitary bacteriological, and microbiological services essential to the operation and administration of the Division of Health programs.

In addition to routine processing of speci-



Alaska Native Health Service field hospital, Kotzebue

mens sent in by physicians, health officers, public health nurses, and hospitals located in their respective cities, each laboratory receives specimens from numerous villages within a sizable radius. Limited investigative studies are included in the programs as far as routine specimen loads permit. These include the study of newer and more efficient laboratory methods, the scientific analyses of routine laboratory findings, and limited laboratory research on public health conditions peculiar to Alaska.

Special and reference microbiological examinations, including animal pathogenicity studies, are provided through the Division of Health laboratories by the Public Health Service Communicable Disease Center in Atlanta,

Ga., and nearby States. A limited amount of special bacteriological, virological, and serologic service is provided by the Infectious Disease and Animal-borne Disease Laboratories of the Arctic Health Research Center.

There are only two resident pathologists in Alaska. One has a small private laboratory in Anchorage; the other is an Air Force officer assigned to Ladd Air Force Base in Fairbanks, who frequently serves as consultant at the Public Health Service hospital in Anchorage. A pathologist from the State of Washington travels to Ketchikan periodically to provide consultation. Many private physicians still send all their pathological and some of their clinical specimens to diagnostic laboratories

outside Alaska. Public Health Service field hospitals maintain small laboratories for simple diagnostic tests, forwarding specimens requiring elaborate processing to laboratories at the Public Health Service hospitals at Anchorage and Mount Edgecumbe.

Private hospitals and physicians' clinics in both the larger and the smaller communities operate clinical laboratories, some of which do only simple diagnostic tests, relying on the larger laboratories for reference and the more exacting procedures.

The Division of Health, in cooperation with the Alaska Society of Medical Technologists, has organized several workshops, conducted by laboratory consultants from the Public Health Service Communicable Disease Center, to expand and improve public health and clinical laboratory services throughout the State.

Private Facilities and Agencies

There are 20 private hospitals and several private medical clinics listed in Alaska. Eighteen of the 20 institutions are classified as general hospitals; one is a chronic disease hospital (Wesleyan Hospital, Seward), and one is a nursing home in Anchorage. Two of the general hospitals are currently closed either because of lack of operating funds (Hudson Stuck Memorial Hospital at Fort Yukon), or inability to recruit and keep staff (Valdez Community Hospital). A total of 526 general hospital beds are therefore available in 16 currently operating hospitals for the care of approximately 137,000 non-native civilian residents of Alaska. Of these 16 private hospitals, only two are located in the whole of interior and northern Alaska, at Fairbanks and Glenallen, and one in western Alaska, at Nome. Six are located in or near Anchorage and the Kenai Peninsula, at Palmer, Anchorage, Seward, Homer, Seldovia, and Kodiak, one at Cordova, and the remaining six in the southeastern Panhandle, at Ketchikan, Wrangell, Petersburg, Sitka, Juneau, and Skagway.

Of the 526 private hospital beds available, 163 are currently classified as "unsuitable" by the Alaska Division of Health. Entire hospitals have been so classified in four communities, usually on the basis of age or type of construction or both.

Ten voluntary agencies supplement official health activities in Alaska. The Alaska Crippled Children's Association and the Alaska Tuberculosis Association have vigorously supported official agency efforts to combat tuberculosis and accompanying orthopedic problems for many years. Two Alaskan groups, the Eye, Ear, Nose, and Throat Foundation of Alaska, and PARCA (Parents' Association for Retarded Children of Alaska), more recently formed, are actively promoting development of research, diagnostic, and treatment programs in their respective fields. The cerebral palsy program of the Alaska State Elks Association currently employs three physical therapists who cover the State by plane or mobile units, supplying services for individuals for whom travel funds to treatment centers are not available.

State and local units of the American Cancer Society, the American Heart Association, and the National Mental Health Association are helping to defray costs of treatment and travel for patients as well as conducting educational activities. Local chapters of the American National Red Cross and the National Foundation are frequently called upon in times of emergency or disaster.

Professional organizations active in Alaska include the Alaska State Medical Association, the Alaska Nurses' Association, the Alaska Dental Society, the Alaska Society of Medical Technologists, the Alaska Hospital Association, and the Alaska chapter of the National Association of Social Workers.

Many villages have organized health councils which assist materially in promoting both routine and special health activities by providing voluntary services and by raising funds.

Health and Medical Services

Medical care necessarily took precedence over preventive medicine in the early development of health services in Alaska. Medical care began with the Russian American Company, which engaged in fur trading, largely employing native workers. According to early reports, in 1866 the Russians were operating 4 hospitals, which admitted 14,550 patients during that year, "of whom only 34 died" (4). But for some years following the purchase of Alaska

from Russia the only medical care available was that provided by a few scattered missionaries or by military physicians attached to Army or Navy units assigned to Alaskan duty for intermittent periods.

Not until 1914 did the Federal Government establish an organized program of medical care for the Territory. This first program was under the auspices of the Bureau of Education. It was operated in conjunction with the first Territorial schools and provided treatment to natives only.

The first official step toward organization of Territorial public health activities was taken in 1913, when the first Territorial Legislature designated the Governor of Alaska to be commissioner of health. The Governor continued in this combined position until 1919, when the office of commissioner of health was created, with a physician appointed to the position on a part-time basis. The part-time commissioner and three part-time deputies constituted the entire health department until 1936, when funds became available through the Social Security Act for employment of a limited staff and establishment of a laboratory. Later, with Alaskan manpower assigned to theaters of war, and with many civilians discouraged into leaving Alaska by the Japanese landing on the Aleutians, lack of personnel reduced public health activity to emergency measures only. Since then, restoration of routine services and recruitment of personnel have been major problems.

In 1945, the Territorial Legislature gave the health department full legal status. It also established a Territorial board of health to act as an advisory body to the Alaska Department of Health, and provided for a commissioner of health on a full-time basis. The board of health was comprised of a representative of each of the four judicial divisions and the Governor.

In 1946, an extraordinary session of the legislature was called by the Governor to consider what could be done about the high rate of tuberculosis. The session resulted in the unanimous passage, by both houses, of a bill to pursue a comprehensive tuberculosis program, with an appropriation of a quarter of a million dollars. This sum was almost tripled by the next regular session of the legislature.

In the meantime, responsibility for medical

care for Alaskan natives, begun by the Bureau of Education, had been transferred in 1931 to the Office (later the Bureau) of Indian Affairs in the Department of the Interior. In July 1955, these services were assigned by Congress to the Public Health Service, Division of Indian Health.

In the years immediately following World War II, health activities of both the newly created department of health and the Alaska Native Service of the Bureau of Indian Affairs were devoted mainly to control of tuberculosis. The Territorial health department sought out active cases by chest X-ray surveys, while the Alaska Native Service tried vainly to find enough beds in its five small hospitals to isolate and treat all the active cases discovered.

From the outset, each health agency necessarily carried on a combined program of medical care and preventive services in order to meet immediate situations.

Gradually, treatment and prevention are being coordinated on an overall basis. Public health nursing services, for example, in outlying areas are currently being provided entirely by the Division of Health, Alaska Department of Health and Welfare, through contractual relations with the Division of Indian Health, Public Health Service. The itinerant public health nurses of the Division of Health carry out a generalized public health nursing program which includes therapeutic as well as preventive and educational functions. Nursing personnel coordinate their activities and work closely with personnel of the Division of Indian Health hospitals.

Health and Medical Personnel

Theoretically, Alaska has 1 physician for every 1,700 persons in the population. Compared with the continental United States average of 1 physician per 800 persons, this ratio is low. The ratio of physicians serving the general population is even lower, because many physicians in Alaska occupy administrative positions or are assigned to serve only special groups, such as military personnel or Alaska Native Health Service beneficiaries.

Table 2 presents an approximate count of the physicians, nurses, and dentists currently work-

Table 2. Medical, nursing, and dental personnel in Alaska, by type of employment, 1959-60¹

Employer	Medical	Nursing		Dental
		Registered	Practical	
Public Health Service	39	181	77	15
Alaska Department of Health and Welfare	7	61	-----	-----
Private practice	117	667	124	54
Total	163	909	201	69

¹ Exclusive of military personnel. Data furnished by official agencies and State boards of medical, nursing, and dental examiners.

ing in Alaska, exclusive of those serving military personnel. Data on other health and paramedical personnel, such as medical social workers, laboratory and X-ray technicians, therapists, and so on, are less easily obtainable and counts fluctuate almost daily.

Public Health Service

Of the 39 physicians employed by the Public Health Service, 14 are stationed in Anchorage either in the Division of Indian Health area office at Anchorage or on the Public Health Service hospital staff, and 10 are located at the Mount Edgecumbe field office and hospital near Sitka. Of the remaining 15 physicians, 10 are stationed at Public Health Service field hospitals, 2 at the Fish and Wildlife Service hospitals in the Pribilof Islands, 2 at the Arctic Health Research Center in Anchorage, and 1 at the Public Health Service outpatient clinic at St. Ann's Hospital in Juneau. Of the 10 Public Health Service physicians assigned to field hospitals, 4 are at Bethel, 2 each at Kotzebue and Tanana, and 1 each at Barrow and Kanakanak.

The 15 Public Health Service dental officers are scattered. Three are at Mount Edgecumbe hospital, three at Anchorage, and one each at Barrow, Bethel, Juneau, Kanakanak, Ketchikan, Kotzebue, Nome, the Pribilof Islands, and Tanana.

There are 79 registered and 43 practical nurses assigned to the Public Health Service hospital in Anchorage, and 60 registered and 34 practical nurses at Mount Edgecumbe. Nurs-

ing staffs of the field hospitals range from 23 at Bethel, 13 registered and 10 practical nurses, to 10, 6 registered and 4 practical, at Tanana. At present, five Public Health Service nurses are assigned to the Arctic Health Research Center. One is a nurse officer assigned to the AHRC staff in Anchorage, and four are stationed at Bethel, where they coordinate their field research activities with those of the Alaska Department of Health and Welfare nurses stationed in the area. Three other Public Health Service nurses are assigned to the staff of the Alaska Department of Health and Welfare and are regarded as State employees.

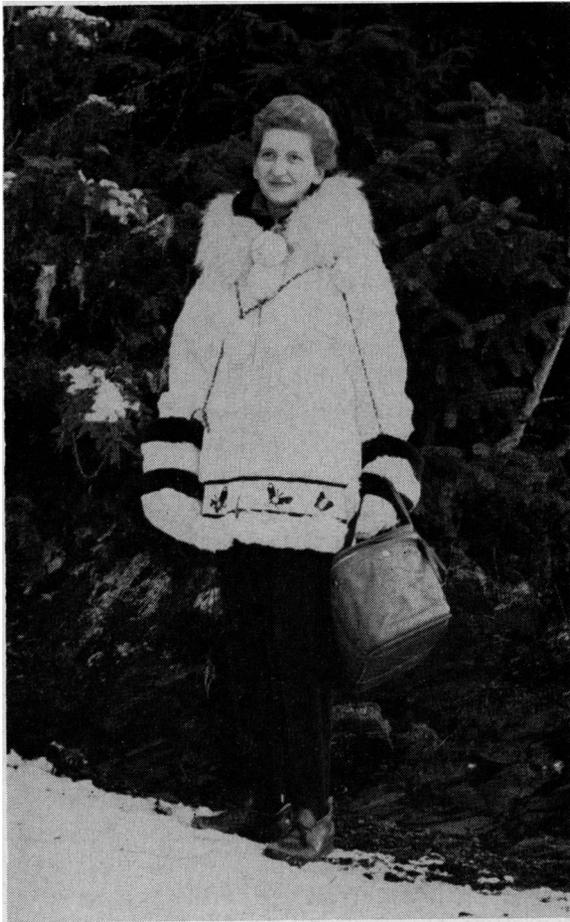
In addition to medical, dental, and nursing personnel, the Public Health Service employs a number of paramedical and other personnel such as are usually associated with hospital staffs and field health service programs. The Alaska Native Health Service also conducts a School of Practical Nursing at Mount Edgecumbe, the only school for nurse education, practical or professional, in Alaska. The school is fully accredited by the National League for Nursing. It provides 12 months of instruction and training and is open only to native residents between 17 and 45 years of age. Since its establishment in 1952, the school has graduated 149 students, of whom 38 are currently employed in the State.

Public Health Service personnel at the Arctic Health Research Center include, in addition to the two physicians and five nurses, research specialists in parasitology, biochemistry, physiology, entomology, and other fields related to public health, medical, and biological research.

Alaska Department of Health and Welfare

Personnel figures for the Alaska Department of Health and Welfare are tentative only, in view of current reorganization and changes in staffing. As of May 1960, there were five full-time and two part-time physicians in the Division of Health, and two full-time and one part-time physicians in the division of mental health. No dentists are currently employed by the Alaska Department of Health and Welfare.

The 61 nurses employed by the Alaska Division of Health include 8 in administrative positions, 28 assigned to urban or community



Public health nurse on her way to make a home call



Equipment required by itinerant public health nurse on field trips

programs, and 25 stationed in outlying areas on itinerant assignments. Each nurse assigned to an itinerant service visits from 2 to 20 villages on as regular a schedule as time, weather, and travel conditions will allow. Two psychiatric nurses have recently been added to the administrative staff of the division of mental health, bringing the total number of nursing positions in the Alaska Department of Health and Welfare to 63.

Sanitary engineers and sanitarians make up the largest group of professional health personnel, other than nurses, employed by the Division of Health. Activities of the 16 sanitary engineers, 6 sanitarians, and 30 part-time sanitation aides employed under contract with the Alaska Native Health Service are outlined in a later section dealing with environmental health. The staff of the Division of Health also includes medical social workers, laboratory personnel, health educators, statisticians, and others.

Private Practitioners

Distribution of physicians and dentists in private practice and of private duty nurses in Alaska follows the usual pattern of urban concentration. Of the 117 physicians in private practice, for example, 49 are located in Anchorage and suburban Spennard, while of 42 dentists in private practice, 24 have their offices in the Anchorage area. Thus, about a third of the private medical practitioners and more than half the private dentists are concentrated in one area. Although the data on individuals in private practice in Juneau, Ketchikan, and Fairbanks are not available, table 3, which includes physicians, dentists, and nurses in government employment as well as in private practice, indicates the relative distribution of these personnel in urban areas.

Many of the physicians and dentists with urban headquarters have their own planes and frequently fly to outlying areas to provide service. A number of local specialists serve as consultants, on a contract basis, to the Alaska Native Health Service. They may provide consultation at the Anchorage or Mount Edgecumbe hospital or during special clinics scheduled at the five field hospitals.

Table 3. Distribution of physicians, nurses, and dentists¹ in four principal Alaskan cities

City	Population ²	Physicians	Nurses	Dentists
Anchorage.....	82,560	65	262	25
Fairbanks.....	42,746	14	56	5
Juneau.....	8,594	8	45	6
Ketchikan.....	9,842	9	28	4
Entire State.....	223,888	163	1,127	54

¹ Includes both government employees and those in private practice, exclusive of military.

² Preliminary census figures released by U.S. Department of Commerce, May 1960.

In both government and private employment, the turnover of professional medical and health personnel is high. Recruiting for outlying areas is frequently handicapped by lack of adequate living quarters. However, this problem is gradually being overcome as funds become available or as individual communities assume the initiative in remedying the local situation.

Medical Social Services

The medical social problems of Alaskan natives related to physical and mental illness are comparable to those which exist in other settings. In Alaska, however, they are intensified and complicated by economic, cultural, and geographic factors. Most villages are distant from medical centers, so when long-term hospitalization is necessary the patient, child or adult, is separated from the emotional and cultural support of family, friends, and community. Extended hospitalization or medical care are frequently complicated by situations such as the following: The ill spouse is replaced by another; children away from home forget their native tongue and upon their return home cannot communicate with their families; children adjust to different foods, environment, and family, if foster placement is made, and readjustment to native family, food, and home is often difficult. Because of the needs of other family members and the almost prohibitive cost of travel to and maintenance near the medical centers, parent or spouse is rarely able to accompany or to visit the patient.

With few trained social workers employed in Alaska's medical and welfare programs, and

with many individuals and families in need of assistance, direct and continuous casework help can be given to a limited number only. Many persons with a wide variety of backgrounds and experience, mainly the field hospital staffs and the itinerant public health nurses, are attempting to give help to people with complicated social problems.

The number of older people in Alaska is increasing, and resources such as nursing homes and chronic disease facilities are limited and not generally available to native patients. In Alaska, as elsewhere, there seems to be a diminishing desire and sense of responsibility on the part of families and communities to care for handicapped, chronically ill, and nonproductive adults unless financial assistance is assured. Few of the crowded native homes have the space or facilities to provide this care.

Health Status

Although vital statistics for Alaska are incomplete, they still afford the best means of assessing current health conditions. Table 4 furnishes a comparison of death rates in Alaska and the United States as a whole for certain causes in 1950 and 1957 or 1958.

Because only crude, unadjusted rates are given for Alaska, the apparent low death rates from cancer, heart disease, and vascular lesions must be interpreted in light of the age distribution of the population. When age adjustments are made, the death rates, except for natives, are approximately equal to those of the 50 States.

Changes in infant and maternal death rates are generally regarded as significant measures of public health and medical progress. In Alaska, although health services are improving, the infant death rate among the native population in 1958 was still almost three times that for the United States (table 5). Among non-native Alaskans, most of whom have readier access to medical facilities, the 1958 infant death rate was slightly above that for the United States.

The apparent increase in the death rate due to diseases of early infancy shown in table 4 actually reflects only the high birth rates resulting from the large proportion of young adults of childbearing age in the population. The

Table 4. Comparative death rates¹ by important causes and race, Alaska, 1950 and 1958,² and United States, 1950 and 1957

Cause of death	Alaska						United States	
	All races		White		Native		1950	1957
	1950	1958	1950	1958	1950	1958		
All causes.....	926.3	610.3	666.7	509.2	1,693.2	1,036.8	963.8	959.0
Tuberculosis.....	174.5	12.0	15.8	5.4	654.9	39.5	22.5	7.8
Other infectious diseases.....	30.7	10.8	8.9	5.3	97.3	34.2	11.7	-----
Influenza and pneumonia.....	56.2	35.4	13.8	20.4	182.9	100.0	31.3	35.8
Other respiratory diseases.....	9.5	21.0	4.0	13.8	26.5	52.6	8.9	-----
Maternal.....	6.6	1.0	2.0	-----	20.6	5.3	2.0	1.0
Congenital malformations.....	10.2	21.0	6.9	20.4	17.7	26.3	12.2	12.8
Diseases of early infancy.....	44.5	76.4	34.6	61.2	76.7	139.5	40.5	39.1
Ill-defined.....	34.3	24.1	20.8	7.9	76.7	89.5	14.9	11.3
Accidents.....	153.3	115.9	132.5	100.0	218.3	181.6	60.6	56.0
Suicides.....	24.1	14.4	25.7	14.5	20.6	13.2	11.4	9.8
Homicides.....	12.4	10.3	10.9	7.9	8.8	15.8	5.3	4.5
Alcoholism.....	8.0	8.7	7.9	6.6	8.8	18.4	1.5	1.3
Cancer.....	65.7	49.2	72.2	48.0	44.2	57.9	139.8	148.7
Vascular lesions.....	47.4	33.3	53.4	31.6	29.5	39.5	104.0	110.2
Heart.....	167.2	113.8	193.9	120.4	82.6	92.1	355.5	369.1
All other causes.....	81.7	62.9	63.4	46.1	127.1	131.6	141.7	-----

¹ All rates per 100,000 estimated population.

² Data residence corrected.

SOURCE: U.S. data from National Office of Vital Statistics, Public Health Service. Alaska data from Bureau of Vital Statistics, Alaska Department of Health and Welfare.

rates given in table 5, showing deaths of infants under 1 year of age per 1,000 live births are a more realistic indicator of natal and postnatal conditions.

From these tables, it is evident that mortality rates in Alaska have improved in recent years. The greatest gain has occurred in control of communicable and infectious diseases, particularly tuberculosis.

Of major concern in Alaska is the increasing number of violent and accidental deaths (table 6). Alaskan death rates from accidents, homicides, and alcoholism are double those for the Nation as a whole. Despite improvement in the past few years, the rates remain high. For several years, accidents have been a leading cause of death among the native population (table 4).

The unusual reliance on air travel in Alaska plus the presence of several large air bases is one considerable factor in the high accident rate. Although the commercial and "bush" air-

Table 5. Infant and maternal death rates in Alaska, 1950, 1956, and 1958, and in the United States, 1950, 1956, and 1957, by race

Type of rate and year	Alaska			United States
	All races	White	Native	
Infant death rate: ¹				
1950.....	50.5	23.8	95.3	29.2
1956.....	41.2	25.3	88.7	26.0
1957.....	(²)	(²)	(²)	26.3
1958.....	39.0	27.9	70.0	(²)
Maternal death rate: ³				
1950.....	24.3	8.7	50.9	8.3
1956.....	6.6	3.7	10.5	4.1
1957.....	(²)	(²)	(²)	4.1
1958.....	5.7	2.1	10.3	(²)

¹ Per 1,000 live births.

² Not available.

³ Per 10,000 live births.

SOURCE: Alaska data from Bureau of Vital Statistics, Alaska Department of Health and Welfare; U.S. data from National Office of Vital Statistics, Public Health Service.

Table 6. Deaths from selected accidental causes, for all races, Alaska, 1954-58

Cause of accident	Number	Percent
All accidents-----	1, 299	100. 0
Transport accidents-----	661	50. 9
Railway, plus other road vehicles--	2	. 2
Motor vehicle-----	169	13. 0
Water transport:		
Drowning-----	158	12. 2
Other-----	26	2. 0
Aircraft ¹ -----	306	23. 5
Nontransport accidents-----	638	49. 1
Poisoning-----	39	3. 0
Falls-----	53	4. 1
Fire-----	115	8. 8
Firearms-----	55	4. 2
Drowning, nontransport-----	131	10. 1
Excessive cold-----	19	1. 5
Other-----	226	17. 4

¹ Predominantly military and noncommercial.

SOURCE: Bureau of Vital Statistics, Alaska Department of Health and Welfare, January 8, 1960.

line safety records in Alaska are excellent, accidents involving planes operated for the sole use of the owner have boosted the mortality rate from transportation accidents to top position. Rates for deaths from drowning and from fires are also high, especially among the native population. Even the number of deaths from motor vehicle accidents is relatively high in Alaska in spite of its limited highways.

Assessing Alaska's morbidity rates is risky. Information available on incidence of communicable and other diseases is incomplete and often inaccurate, and can be misleading. While it can be stated with some accuracy that there have been no recent decimating epidemics of childhood diseases among the native population, such as have occurred in past years, the true incidence of disease is unknown. Most of the difficulty in obtaining accurate information on morbidity stems from the lack of medical facilities and personnel. Cases of disease in outlying villages may be missed entirely or may be inaccurately reported by untrained observers.

The situation is gradually improving as better communications are established and as funds become available for assigning trained personnel to the field. Education has also played a major role in improving the reporting of disease outbreaks and in obtaining prompt

medical attention when needed. Village teachers and missionaries have effectively supplemented the efforts of health personnel in helping villagers to learn about and to accept sanitation and other health practices.

A continuing handicap to accurate diagnosis and reporting of disease in remote areas is the difficulty of obtaining laboratory specimens for confirmation within a reasonable time after the onset of illness.

Diagnostic laboratories, other than those located in the major population centers, are few and far between. The process of collecting and delivering specimens to the laboratory is complicated by travel delays which may cause cultures to die or to freeze en route. The cost of laboratory services is not inconsiderable in Alaska. In 1958 the average cost of these services in the Alaska Division of Health laboratories was \$1.47 per specimen, or 52.6 cents per capita, about three times greater than in many smaller, more densely populated States.

Tuberculosis

Tuberculosis has been Alaska's number one health problem for well over a century, according to historical reports. There is no evidence that tuberculosis existed among Alaskan natives prior to the arrival of the white man, but once introduced, the disease apparently spread rapidly. The first reference to the occurrence of tuberculosis among the native peoples of Alaska, according to Aronson (5), appeared in 1770, some 29 years after the discovery of Alaska. But by 1814, tuberculosis was reported as one of the most common diseases among the natives. From that time on references to the large numbers of cases of and deaths from tuberculosis are frequent.

A 5-year study of the causes of death in Alaska, 1926-30, revealed that the tuberculosis death rate among Alaskan natives during that period was 655 per 100,000 population (6). The very first issue of *Alaska's Health* (7) the official publication of the Division of Health, contains the following statements:

“. . . tuberculosis is 10 times as prevalent in Alaska as in the northern States and far surpasses all our communicable disease problems together as a direct cause of death.”

“. . . tuberculosis is causing more servicemen

to be sent back to the States from Alaska than from any other outpost of the war."

"Large numbers of natives are unsuited to military service because of tuberculosis."

"Nearly 90 percent of routine X-rays among natives in the Arctic indicate the presence of tuberculosis."

In 1950, the tuberculosis death rate among Alaskan Eskimos and Indians was still an appalling 654.9 per 100,000. But between 1950 and 1957 a remarkable change occurred, and by 1957 the tuberculosis mortality rate among natives had been reduced to 116.2 per 100,000 (table 7). Provisional rates for 1959 show a further reduction to 53.8 per 100,000 in the native population.

The story behind this dramatic reduction in tuberculosis deaths began in 1946, during a special session of the Territorial Legislature, called by the Governor at the behest of the Territorial department of health and the board of health. There were, at the time, 4,000 known active cases of tuberculosis in Alaska, with about 75 hospital beds available for tuberculosis patients in the entire Territory.

Beginning with this special session, in the next few years Alaska's Legislature appropriated more funds per capita for tuberculosis control than any State legislature in the Nation. These Territorial funds, plus generous contributions of Federal funds made available by Congress beginning in 1948, accelerated control

of tuberculosis within the next decade to the point where Alaska can now care for all its tuberculosis patients within its own borders. This in itself has been a major achievement.

In spite of the tremendous gains in the past 14 years, tuberculosis is still a major health problem demanding continued effort and vigilance. During 1959, there were 356 newly reported active and probably active cases, representing a rate of 178.0 cases per 100,000 total population. As in past years, the preponderance of cases (766.6 per 100,000) was found in the native population (8).

Although the methods employed in the 1950-57 Alaska campaign against tuberculosis were the same procedures used elsewhere, that is, casefinding, hospitalization, chemotherapy, rehabilitation, education, and followup, their application in Alaska demanded drastic modification and ingenuity.

Generally in the 48 States, the highest incidence of tuberculosis has been found in urban areas. In Alaska, the highest incidence occurs in the small Eskimo, Indian, and Aleut villages, particularly those located in the Kuskokwim and Yukon River deltas. As in urban slum areas in continental United States, the economic status in these villages is marginal, many of the homes are crowded and poorly ventilated, and most of them lack sanitary facilities. Nutrition is poor and resistance to disease is generally low.

Table 7. Tuberculosis deaths, all forms, and death rates,¹ by race, Alaska, 1950-59

Year	Total		White ²		Native ²	
	Number	Rate	Number	Rate	Number	Rate
1950-----	239	174.5	16	15.8	222	654.9
1951-----	239	148.4	13	10.5	223	655.9
1952-----	191	100.0	19	12.4	171	500.7
1953-----	130	63.4	10	6.0	120	349.8
1954-----	97	46.7	14	8.3	82	236.6
1955-----	54	25.8	8	4.7	45	128.6
1956-----	50	24.3	9	5.5	41	114.0
1957-----	56	26.5	13	7.7	43	116.2
1958-----	23	12.0	8	5.4	15	39.5
1959 ³ -----	24	12.0	3	1.9	21	53.8

¹ Per 100,000 population.

² Figures for whites and natives do not necessarily add to total, which may include certain other races not shown in detail here.

³ Provisional figures.

SOURCE: Alaska Department of Health and Welfare.



Village of Atka far out toward the tip of the Aleutian Islands Chain (beyond area shown on map)

Tuberculosis casefinding in the early days of the Alaskan campaign was limited to the field hospitals and a single Territorial department of health mobile X-ray unit which traveled from village to village by whatever mode of transportation was available, as time, weather, and funds permitted. Developing the exposed film often had to be delayed for weeks until the technician reached a hospital equipped for film processing. In early 1945, a motorship, the *Hygiene*, was put into operation as a floating X-ray and clinic unit, visiting communities along the southeastern coast.

When the organized campaign against tuberculosis was begun, official and voluntary agencies combined their resources to put additional X-ray facilities into operation. Two additional marine units were equipped to extend health services to northern coastal and inland river villages. A railroad car, furnished by the Alaska Railroad, was outfitted to serve rail-belt communities, and a motor truck unit was provided for surveying communities along the Alaska Highway and the limited access roads.

Airborne units were also used to reach the many communities accessible only by air.

As air travel improved, the various mobile surface units were gradually withdrawn from service, and from 1957 on, most of the X-ray activities have been performed by three airborne units. Each unit is equipped with a portable X-ray machine, darkroom tent, and gasoline generator, and each is manned by a technician. Two of the units are supported by the Public Health Service Division of Indian Health, the third by the Alaska Division of Health.

Of 37,695 chest X-rays taken in 1959, almost two-thirds were taken by the three airborne units. The remaining X-rays were taken by health centers, Alaska Native Health Service hospitals, general hospitals, the U.S. Coast Guard, and the Alaska National Guard.

Laboratory work relating to tuberculosis control constitutes a major item in the work schedules of the four Alaska Division of Health laboratories. During 1959, a total of 22,868 tuberculosis smears and cultures were processed in

the four laboratories. Over 15,000 individuals were tuberculin tested in 1959 in connection with casefinding or followup activities, the majority on request of physicians.

Facilities in Alaska are adequate today for treating all tuberculosis cases requiring hospitalization. The 75 tuberculosis beds available in 1946 had been increased by 1953 to 796, chiefly by the opening of the Alaska Native Service hospitals at Mount Edgecumbe and Anchorage. Even with this tenfold increase, however, the number of available beds still fell far short of meeting the need.

In 1955, additional beds were made available on a contract basis at hospitals and sanatoriums in the State of Washington. On December 31, 1955, the total number of Alaskan patients hospitalized for tuberculosis within and outside Alaska was 1,311. By December 31, 1958, the number had dropped to 444, all hospitalized within Alaska. This drop represents a significant gain, inasmuch as by 1958 the requirements for hospital admission had been considerably relaxed, and patients who would not have been considered in 1955 were now being admitted.

Only 6 years ago, the waiting period for tuberculosis hospitalization often defeated the casefinding program. Take the hypothetical, but typical, case of Wassillie Niptuk, 40-year-old Eskimo from Iliamna. Wassillie received his chest X-ray in August 1954. When the film was developed and read a month later, the need for hospitalization was indicated. His name was put on the priority board list in January 1955, but a hospital bed did not become available until October of that year. When the hospital tried to contact Wassillie to arrange for hospitalization, the public health nurse reported Wassillie had died the previous week.

Public health and medical personnel in Alaska are particularly proud of the fact that few Alaskan tuberculosis patients leave the hospital against medical advice. Of 480 hospital discharges in 1959, only 12 were against medical advice. In the 48 States, more than 30 percent of the annual discharges have usually been against medical advice (9).

Late in 1954, when many tuberculosis patients had to wait months for hospitalization, a home

treatment program based on the use of drugs and antibiotics was initiated among native patients in their home villages. The initial objective of the ambulatory chemotherapy program was to determine whether a scheme of administering isoniazid (INH) and para-aminosalicylic acid (PAS) on an ambulatory basis over a long time with, at best, only intermittent supervision was a practicable procedure in Alaska. The program, financially supported by the Public Health Service, was inaugurated in December 1954 under the direction of the Arctic Health Research Center in cooperation with the Territorial department of health and the Alaska Native Service.

During the next 1½ years, the chemotherapy program was extended to 70 native villages in northern, western, interior, and south-central Alaska, where tuberculosis was especially prevalent. By mid-1956, when some 1,600 patients were participating, the program had been widely accepted and was deemed practical and became a continuing phase of the treatment for tuberculosis. In September 1956, the Territorial health department assumed responsibility for continuing chemotherapy in native villages in all of Alaska save the Bethel area where the Arctic Health Research Center retained responsibility for the program.

Patients were started on chemotherapy on recommendation by physician members of a priority board, primarily on the basis of X-ray evidence or positive sputum reports, or both. In general, tuberculosis patients who were started on chemotherapy included those awaiting hospitalization, those returning from the hospital, and patients who, because of shortage of hospital beds, could not be admitted at the time hospitalization was recommended.

Recommendations of the priority board were given to medical officers in the Alaska Native Health Service field hospitals, who issued orders for therapy to teams of field nurses. The nurses were directly responsible for bringing the program to the villagers, eliciting cooperation of patients, supervising administration of the drugs, explaining the program, and evaluating the response. In each village, the nurse was assisted by a native chemotherapy aide, usually selected by the village council for training by the nurse.

The success of the chemotherapy program testifies to the effectiveness of the concerted efforts of all individuals and agencies concerned. Of particular importance were the close working relationships which developed among governmental agencies; the cooperation and assistance given by the village teachers; the willing participation and cooperation of the Eskimos and Indians, who were only too well aware of the specter of tuberculosis; and above all, the dedicated efforts of the nurses, who were directly responsible for explaining the program and insuring its acceptance.

The precise contribution of the ambulatory chemotherapy program to the tuberculosis control program cannot be determined. There is little question, however, that initiation of home treatment during the period of waiting for hospitalization, together with drug therapy during hospitalization, radically shortened the length of stay in the hospital, thus making beds available to more patients.

In the Bethel area, the number of village patients on home treatment fell from nearly 1,100 persons, 18 percent of the population in participating villages, in September 1956, to 400 persons at the end of 1958. By 1957, the characteristics of the population on home treatment had shifted completely. Instead of a preponderance of patients awaiting hospitalization, the majority were posthospital cases. The tide of tuberculosis had turned.

Even while the need for effective treatment still seemed desperate, hopes were raised for a means of preventing tuberculosis infection. A tightly controlled study of the effectiveness of INH in tuberculosis prevention was initiated in southwestern Alaska late in 1957 by the Public Health Service Tuberculosis Program and the Arctic Health Research Center in conjunction with the Alaska Native Health Service. Some 5,000 persons, 80 percent of the total population, in 24 villages were put on daily medication for 1 year. Although results of this study will not be known for several years, it is anticipated that this trial, in combination with other trials in the rest of the country, will demonstrate whether or not the administration of isoniazid will prevent the development of tuberculosis or the relapse of tuberculosis patients.

Other Diseases

For lack of data on diseases other than tuberculosis in Alaska, estimates of current morbidity are, of necessity, based largely on clinical observation, supplemented by a few morbidity studies.

For many years the Alaska Division of Health has compiled reports of notifiable diseases from data submitted by the health centers in the larger communities, weekly laboratory reports, and intermittent postal card reports from individual physicians. According to a 20-year summary based on these reports, the "top 10" diseases in order of numbers of cases reported were: influenza and pneumonia, measles (including German measles), tuberculosis, chickenpox, gonorrhoea, mumps, impetigo, syphilis, streptococcal sore throat, and whooping cough.

A limited morbidity study conducted in the Anchorage area in 1952 indicated that the pattern of illness in that area differed little from that found in cities of similar size in continental United States. Respiratory illnesses led the list in both instances but with fewer days of disability in Anchorage than elsewhere. Detailed morbidity studies are currently underway in the field.

Early attempts to assess morbidity by hospital admissions throughout Alaska met with little success, because of the lack of medical records. In many instances, the admitting physician was frequently the only individual who knew why the patient was in the hospital. In the early years, records from the Alaska Native Service hospitals invariably listed tuberculosis as the sole reason for hospitalization.

As indicated earlier, the data on death rates from heart disease, cancer, and other diseases associated with aging are misleading because of Alaska's predominantly young population. A study of heart disease among Alaskan Eskimos and Indians is now underway, and results of this study may alter the general impression that native groups are not subject to the same stresses and strains as the white population.

Progress toward control of communicable disease in Alaska is uneven. The problems of the larger communities are essentially the same as those found in all urban areas where pop-

ulation growth outstrips the planning and development of adequate sanitary facilities and health services. In view of the frontier character of even the larger Alaskan cities, it is remarkable that there have been no major outbreaks of communicable disease. As for the villages, although epidemics of mumps, measles, and other so-called childhood diseases occur from time to time, their effects are far less devastating than in former years, thanks to the vigorous immunization and education programs carried on by the Alaska Division of Health and the hospitals of the Public Health Service Division of Indian Health. Improvements in home and village sanitation, slow as they are, are real. Many tuberculosis patients returning to their villages from the hospital have contributed to these improvements by encouraging other ill persons to seek treatment and by demonstrating improved housekeeping and personal practices learned in the hospital.

Enteric infections are known to be common in Alaska, particularly rural Alaska, although their incidence is not on record. Itinerant public health nurses and individual investigators report that enteric upsets occur so frequently in villages that they are regarded by the people as normal events and are seldom reported. Those upsets which are reported are rarely confirmed by laboratory or clinical methods, for reasons cited earlier.

Field and laboratory studies have turned up relatively few bacterial pathogens in connection with outbreaks of enteric disease. Only 625 cases of salmonellosis, paratyphoid fever, and typhoid fever were reported in Alaska between 1937 and 1957. During the same period, 576 cases of enteric disease were reported as gastroenteritis and 682 as diarrheal infections. *Salmonella typhimurium*, *Salmonella typhosa*, *Shigella flexneri*, and *Shigella sonnei* are the species most often isolated in the laboratory.

The incidence of enteric infection is higher in summer than in winter, increases with the spring breakup, and continues sporadically until freezeup. Although the exact modes of transmission of organisms are not known, the number of long-drawn-out household epidemics implicates poor food handling, contaminated water supply, and overcrowded dwellings. Indirect transmission of infection through con-

tamination of the surroundings by dogs, which abound in each village, has been demonstrated for *Salmonella typhosa*. Intensive short-term studies of intestinal parasitism have shown a high prevalence in some areas of parasitic infestation, notably fish tapeworm. A 30 percent infection rate has been reported in single villages (10).

Blood sugar determinations performed on 1,227 Eskimos, plus review of clinical records of Alaska Native Health Service hospitals and available vital statistics reports, have uncovered only 3 confirmed and 2 doubtful cases of diabetes mellitus among the 16,000 Eskimos living in Alaska (11). Although age distribution and lack of diagnostic facilities no doubt account in part for the infrequency of diabetes, nutrition and racial characteristics may be factors. Possibly an increase in the number of cases of diabetes may be expected as the transition from native to imported foods continues.

A moderate form of anemia has been found to occur in Eskimos over much of Alaska (12). Results of detailed investigations and experimental studies of the effects of iron therapy suggest that iron deficiency and some other factor, as yet undetermined, are associated with the condition. Also, dietary studies and clinical observations indicate that iron intake among Eskimos is below allowances recommended by the National Research Council. The possibility that low hemoglobin levels might be associated with fish tapeworm infestation was investigated, but no apparent relationship could be demonstrated.

Corneal scarring with resultant loss of visual acuity has long been considered a major affliction of Eskimos and Indians. Various causes for this eye condition have been explored by investigators in past years, but no completely satisfactory explanation has been established. Tuberculosis, nutritional deficiencies, snow blindness, and indifferent personal hygiene have all been suggested. Tuberculosis is generally given most of the blame, although it is not invariably associated with phlyctenular keratoconjunctivitis (PKC).

A preliminary survey to determine prevalence of corneal scarring, the first step in an epidemiological study of PKC, showed that 41 percent of 6,000 persons examined had corneal

scars, with varying degrees of visual impairment.

Animal-borne diseases, such as trichinosis, rabies, and echinococcosis or hydatid disease, are known to occur in Alaska in somewhat different patterns than are found elsewhere. For example, trichinosis occurs in walrus, in black, grizzly, and polar bears, and in a number of other flesh-eating animals on which the natives depend for meat. In one survey, 27 percent of the residents of one coastal village showed positive reaction to skin tests for trichinosis. As pork production is extremely limited in Alaska, most human cases of trichinosis here are attributed to undercooked bear meat.

Rabies is endemic among wild animals in Alaska, and it is generally believed that the large fox population serves as a reservoir for the disease. Despite frequent reports of dog bites, only three clinical cases of human rabies have been reported. None was confirmed by laboratory examination. In view of the large dog population in Alaska and the close association of these animals with villagers, the low case rate of human rabies is puzzling. Three possible explanations have been advanced: (a) that the dog team owner, thoroughly familiar with the behavior of rabid foxes, wolves, and dogs, is quick to destroy any animals exhibiting typical symptoms; (b) that the heavy fur, wool, and skin clothing worn by both children and adults provides effective protection against bites; and (c) that the type of rabies endemic in Alaska is less virulent than the types found elsewhere. Special studies of the last theory are underway.

A number of cases of the cystic form of hydatid disease, caused by *Echinococcus granulosus*, have been found in Alaska since this form of the disease was first recognized in 1948. Surgical removal of the cysts, which are usually found in the lungs, has been accomplished with good prognosis.

The occurrence of a second form of echinococcosis in Alaska was first recognized in 1952 in the course of investigations underway at the Arctic Health Research Center. This second or alveolar form of hydatid disease, caused by *Echinococcus multilocularis*, presents a much more serious aspect than cystic echinococcosis. Nine human cases of this form of the disease

have been discovered in Alaska in the last few years. The liver is the most common site of this infection, and early diagnosis is extremely difficult. Generally, by the time the disease is recognizable in man it is inoperable.

Alaskan investigators are working in close collaboration with laboratories in other parts of the United States and with European investigators in an attempt to find effective diagnostic methods which will permit earlier detection and treatment of alveolar hydatid disease. The life cycle of *E. multilocularis* in Alaska has been found to include voles and arctic foxes. Dogs frequently become involved and man becomes infected accidentally. The infection is transmitted by fecal contamination, but the exact details of transmission are not known.

Dental Health

The general impression has been that Alaskans, as a group, have poor teeth. Examinations of Eskimo and Indian patients at Public Health Service hospitals and during infrequent field visits have confirmed this impression. Little information is available concerning the dental health of the white adult civilian population, aside from the fact that dentists in private practice in Alaska are extremely busy.

According to two 1955 dental surveys conducted by the Public Health Service, school-age children in the Anchorage area showed a lower rate of tooth decay than did children in the same age groups in Tacoma, Wash. By contrast, 1952 statistical estimates of the amount of tooth decay among Eskimo children at Barrow and among Indian children at Ketchikan indicated the highest decay rates reported anywhere in the United States and its possessions. Observers also find that the more isolated the village, the smaller the number of decayed teeth. In such villages there tends to be a high proportion of protein and fat in the diet and relatively little carbohydrate.

Expansion of Public Health Service dental health services among Eskimo and Indian residents has presumably reduced the backlog of acute dental needs to some extent, but the field of preventive dentistry has hardly been touched.



Eskimo woman sewing on parka. Eskimo women are artists at skin and fur sewing and make boots (mukluks) and parkas for themselves and their families. Use of their teeth in "crimping" the mukluk soles can lead to a dental problem.

At the present time, Anchorage is the only Alaskan community fluoridating its water supply; however, this particular supply serves only about one-fourth of the total population of the Anchorage area. Since the majority of Alaska's population is still dependent on individual wells or other private sources of supply, the benefits of fluoridation are not likely to be made available on a large scale for some time.

Questionnaires on the subject of health services distributed to village chiefs and officials brought the following replies (13): "No dentist

ever been here." "No dentist stop here for 10 years." "When dentist comes only has time for extractions."

The dental care situation among non-native civilians living outside the few metropolitan areas has not improved. Of the 54 dentists in Alaska, 40 are located in the 4 largest cities. Emergency patients from outlying communities must travel to the nearest urban area, hoping that one of the dentists will squeeze him in on his crowded schedule. All too often the patient discovers that multiple treatments are needed, and his dental bill is increased by the expense of board and room and travel.

Maternal and Child Health

For many years, health services for children in Alaska were overwhelmed by the number of acute orthopedic deformities caused by tuberculosis of bones and joints. Shortly after the orthopedic section of the Mount Edgecumbe hospital opened in 1946, it was believed to have more patients with bone tuberculosis under its roof than any other one spot in North America. As recently as 1955, bone tuberculosis was found frequently among Eskimo and Indian children by traveling orthopedic clinics during annual circuits. Happily, progress in control of extrapulmonary as well as pulmonary tuberculosis has been such that bone tuberculosis today is almost as rare in Alaska as in other States.

At present, upper respiratory infection is responsible for more disability in Alaskan children than any other single disease entity. Chronically draining ears and chronic mastoiditis, with varying degrees of hearing loss, are highly prevalent. Estimates based on surveys by competent otologists indicate that as many as 3,000 children in Alaska require radical mastoidectomies before their chronic infections can be cleared up.

The number of children requiring extensive surgical treatment and the expense of transporting patients for treatment have spurred attempts to find means of reducing complications from respiratory disease. A special study was undertaken in 1957-58 to see if an intensive program of prevention would be effective. Six villages along the lower Yukon and lower Kus-

kokwim Rivers in western Alaska were known to have exceptionally high rates of chronic ear, nose, and throat infections. A team consisting of a physician, two public health nurses, and a health educator was sent to these villages by the Alaska Division of Health. The health educator was assigned to study the attitudes of the villagers and, if possible, find ways of encouraging them to improve health practices. The two nurses supported the medical and educational services by following up special cases through home visits. Consultation services were available from personnel of the Division of Health and other agencies. Nose, throat, and other specimens were collected periodically and forwarded to the Epidemiology Section of the Arctic Health Research Center for culture and study. The accumulated laboratory findings and field data are now being analyzed.

More than 1,500 handicapped or injured Alaskan children received diagnosis, treatment, or hospitalization through the Division of Health during 1959. Under the program operated by the crippled children's services section of the Division of Health and financed by State and Federal funds, services are provided for orthopedic, plastic, eye, ear, nose, and throat, and chronic disease cases.

A total of 1,518 children received diagnosis or treatment for 41 different crippling conditions (14), including the following:

<i>Condition</i>	<i>Cases</i>
Tuberculosis of bones and joints.....	76
Aftereffects of poliomyelitis.....	43
Cerebral palsy.....	35
Eye conditions (ranging from simple corrections to surgery).....	411
Deafness and hearing impairment.....	146
Heart conditions, including heart surgery.....	135
Congenital malformations.....	226
Severe burn cases, requiring long hospitalization and care.....	6

During the year 128 children were hospitalized a total of 1,074 days, or the equivalent of nearly 3 years. Children requiring complicated treatment for such conditions as cleft lip and palate and for severe burns are sent to Seattle for treatment. Children with congenital heart disease are sent to San Francisco for specialized diagnostic workups and for heart surgery, including the new open heart surgery.

Transportation costs constitute a large item in the child health program. Between July 1 and December 31, 1958, for example, transportation costs accounted for 20 percent of the total cost of the services provided.

This financial strain has been eased materially by the Alaska Native Health Service and by voluntary groups, notably the Alaska Crippled Children's Association and the Alaska Tuberculosis Association. State, Federal, and voluntary agencies have also cooperated in bringing specialists to Alaska for diagnostic clinics, consultation, and training sessions.

Mental Health

Responsibility for management of its own mental health problems was transferred to Alaska from the Department of the Interior as recently as 1956. In passing the Alaska Mental Health Act that year, Congress also gave Alaska the right to select 1 million acres of public lands within its borders to be used as a source of income for support of mental health services.

Hospitalization for most of Alaska's mental patients is still provided through contractual arrangements with Morningside Hospital, a private institution in Portland, Oreg., as it was under the Department of the Interior. Total cost of the Morningside program in 1958 amounted to \$1,100,000, including \$44,000 for transportation of patients and escorts. Seventy-nine Alaskan patients were admitted to Morningside Hospital during 1958, with a total of 404 Alaskan patients on the hospital records as of December 31, 1958.

The diagnostic classification of the 79 patients admitted to Morningside during 1958 was:

<i>Diagnosis</i>	<i>Percent</i>
Psychotic disorders.....	45.5
Chronic brain syndrome.....	21.5
Mental deficiency.....	17.5
Psychoneurotic disorders.....	7.5
Personality disorders.....	3.7
Transient situational disorders.....	1.3
Undiagnosed.....	3.0

Alaska has begun to develop an integrated program of mental health activities, including diagnostic, preventive, and educational services. Under the direction of the division of mental health of the State department of health

and welfare, studies have been made of Alaskan patients admitted to Morningside Hospital during recent years to determine their distribution by age, sex, and race as well as by diagnosis.

One of the most significant findings is the marked increase between 1948 and 1958 in the number of admissions among patients in the younger age groups. Comparison of data on admissions for the two 5-year periods, 1949-53 and 1954-58, shows a 68 percent increase in the admission of patients under 6 years of age during the period 1954-58 and a 46 percent increase among the 6- to 10-year-olds during the same period. These increases may be attributable in part to the practice of sending mental defectives to Morningside for lack of any alternative facility in Alaska. However, a significant proportion of the increase is undoubtedly due to disturbances among young people which presumably might have been detected earlier and treated locally had community facilities been available.

During 1958, mental health outpatient clinics were provided for southeastern Alaska through the Juneau office, and for the south-central region through the Anchorage office. Thus far, only consultative services have been possible for the northern region. Personnel of the mental health division travel as teams to communities outside the urban areas. In the 12 months ending June 30, 1958, the clinic personnel and traveling teams saw 419 patients and conducted 1,527 interviews.

Of the 419 outpatients seen, 233 were male, 186 were female; 270 were under 18 years of age and 149 were over 18. Patient referrals came from the Alaska Native Health Service, the Alaska Department of Health (for the most part from public health nurses), the Office of Vocational Rehabilitation, public schools, police officials, Federal courts, U.S. commissioners, the Alaska Department of Welfare bureau of juvenile institutions, private physicians, and other sources.

Since 1957, voluntary admission to Morningside Hospital has been permissible and jury trials are no longer required, although the protection of a court hearing has been retained for those who desire it. In 1958, of the 79 admissions, 39 were voluntary, 22 were judicial, and 13, certified by a physician, were involuntary.

The remaining five included one transfer and four patients returned from convalescent leaves.

Of the cases closed during 1957, nearly half bore the notation "further care indicated," but the needed clinic services or community resources were not available.

Environmental Health

Alaska's environmental health needs include both the familiar and the unique. In Ketchikan, Juneau, Anchorage, and other urban communities located in the more temperate southern and central portions of Alaska, the tasks confronting the sanitary engineer do not differ markedly from those found in many cities of comparable size in continental United States. On the west coast and in interior and northern Alaska, the tasks are complicated by permafrost, extremes of temperature, and the character of the small, widely dispersed communities.

Throughout Alaska, unique political, economic, and social structures require "custom tailoring" of services, which tax the ingenuity of environmental health personnel. Only in the north is a sanitary engineer called upon to collaborate in developing a manual for the handling and tethering of sled dogs or to demonstrate how to drill a well through several hundred feet of permafrost.

Sanitation services in Alaska are currently provided for both the State as a whole and for more than 300 individual communities by a staff of 22 engineers and sanitarians in the department of health and welfare; by a lone sanitary engineer in the area office of the Alaska Native Health Service; and by 30 part-time sanitation aides who are employed through contractual arrangements between the State Division of Health and the Alaska Native Health Service.

The professional staff of the Division of Health carries on educational, consultative, supervisory, and inspection services and administers statewide programs involving industrial health, water pollution control, radiological health, and safeguarding of foods, drugs, and cosmetics. The Alaska Native Health Service sanitary engineer is charged with the responsibility of inspecting sanitary facilities at all the Public Health Service hospitals and at Bureau of Indian Affairs boarding and day schools throughout Alaska.



Waste disposal beside frame house

In the outlying villages, the efforts of the staffs of the two official agencies are reinforced by part-time Eskimo and Indian sanitation aides. The aides, selected by joint agreement of the village council and health agency representatives, receive brief but intensive training in basic sanitation through courses planned and administered by the Division of Health in consultation with personnel of the Alaska Department of Health and Welfare, Alaska Native Health Service, and Arctic Health Research Center. Activities of the aides in their assigned villages are supervised and reviewed periodically by the same agencies.

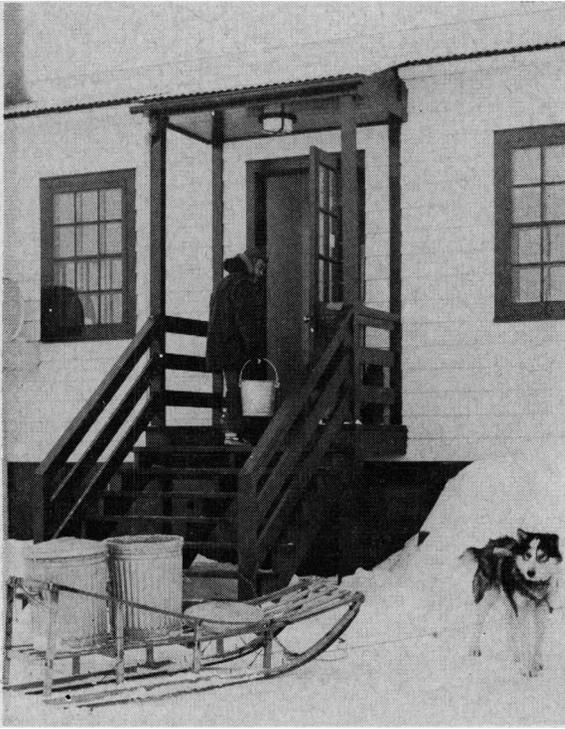
Adaptation of water supply, waste disposal, housing, and food-handling methods to Alaskan needs requires careful observation and research. As temperature drops, operation and effectiveness of many of the standard sanitation devices and practices are impaired unless countermeasures are applied. Chemical and biological reactions are generally retarded at low temperatures, and the physical properties of materials are often changed.

The Alaska Division of Health cooperates closely with designing engineers, architects, public agencies, the Arctic Health Research Center, and other groups in developing and promoting needed modifications of standard devices. A recirculating water system installed at Fairbanks, largely as the result of the joint effort of the Alaska Division of Health and the Arctic Health Research Center, has been called the most ingenious water system in North

America. The farthest north sewage stabilization pond, now in operation at Fort Yukon, is another example of such a joint effort by these two agencies. Basic data on coastal and inland waters and their ability to assimilate wastes are also being accumulated. Experimental closed-circuit toilet units have been installed at various locations through interagency cooperation. These are being observed as a possible waste disposal method for isolated dwellings and small settlements where conventional systems are impractical because of extremes of temperature, scarcity of water, or presence of permafrost, separately or in combination. Coordination of planning and joint financing of projects among the three official health agencies is slowly but surely paying dividends in improvements in community sanitation.

Many of Alaska's environmental sanitation problems could be solved were adequate money available. Per capita incomes in the small communities are invariably too low to finance utilities even of the most simple variety. The Indian Sanitation Facilities Bill, which became Public Law 86-121 in July 1959, offers some assistance to the small native villages in developing community water supplies and in improving home and village waste disposal facilities through cooperative projects. The number of requests for such projects already received testifies to the great interest in the program. Many villagers have indicated their awareness of need for improvements and their eagerness and willingness to contribute local materials and labor as their share in the projects.

Education and demonstration play an essential part in village improvements. Without community acceptance and understanding of sanitary methods and facilities, improvements are worthless. Constant supervision in each community is obviously impossible in an itinerant program, where even the part-time sanitation aide may be given responsibility for more than one village. Emphasis is placed therefore on the need for careful explanations, which must often be given through an interpreter, to develop complete understanding within limits of the educational levels of the residents. Evidence of the achievement in education is seen in changed practices and atti-



Water supply is a problem in the Arctic. Cans are used to dip water through holes in the ice on lakes or rivers. Sanitarians and public health nurses stress boiling or chlorine treatment of water for household use.

tudes observed among residents in the various villages and in the increasing number of requests for advice and assistance received by all health agencies.

Housing

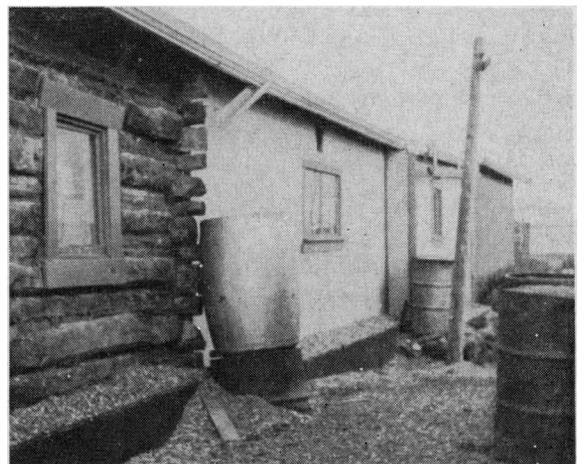
Health and population gains in native villages and rising standards of living are intensifying demands for better housing in many communities. Experimental houses, based on designs specifically adapted to climatic conditions which exist in different parts of Alaska, have been constructed in several villages as demonstration units. A scale model of each experimental unit was built and taken to the village so that local residents could follow construction details and participate in the building program. As each unit is completed, a local family, selected jointly by the village council and health agency representatives, occupies the dwelling rent free for a trial period, during



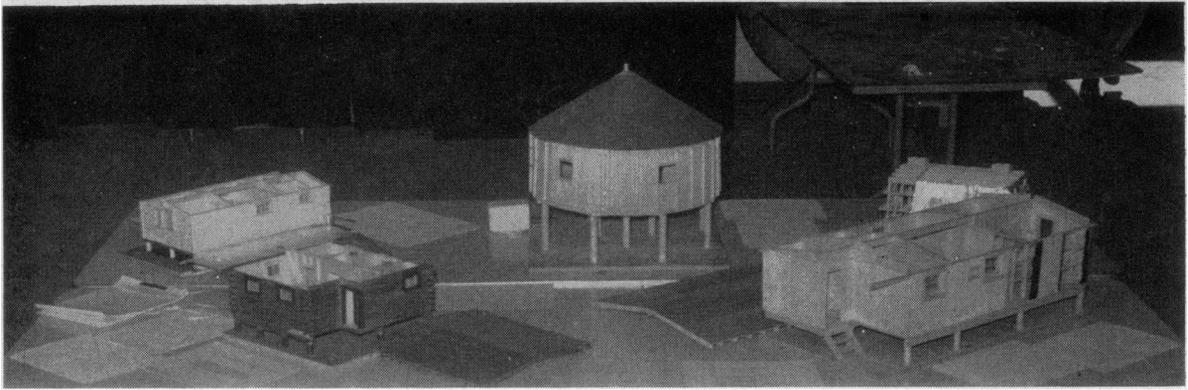
Well jetting through permafrost, Eek



Experimental water supply reservoir, Goose Lake



Water storage barrel outside house



Models of experimental houses designed by Arctic Health Research Center for construction in native villages. Designs, construction methods, and materials are adapted to varying environmental conditions and needs of individual villages.

which records of fuel consumption, temperature and humidity levels, and other data are kept. Since economy is a major consideration, every effort is made to utilize local building materials. Several of the experimental houses incorporate features commonly lacking in typical native homes, such as separate bedroom space, kitchen sinks, sanitary toilet facilities, ventilating devices, and, in one instance, an inside well.

Control of Insect Pests

The bloodsucking flies and their control comprise one of the most important environmental problems in Alaska. More than 100 species of mosquitoes, black flies, snipe flies, punkies, and horse flies occur in the State, and half of them bite humans. Their biting and the annoyance they cause are a severe handicap to essential outdoor occupations and to recreational activities, and their bites occasionally may lead to serious secondary infections or allergic reactions. Their status as vectors of disease is still unknown.

In southeast Alaska the biting-fly season lasts about 6 months, from mid-April into October. In localized areas, biting is intense for relatively short periods, depending on which pest is involved. The biting season becomes progressively shorter, but less localized and more intense, northward to the Arctic slope, where it lasts less than a month, during late June and early July. Along the Arctic slope, biting by insects is perhaps the most intense in the

world, with a few species of *Aedes* mosquitoes almost the sole offenders.

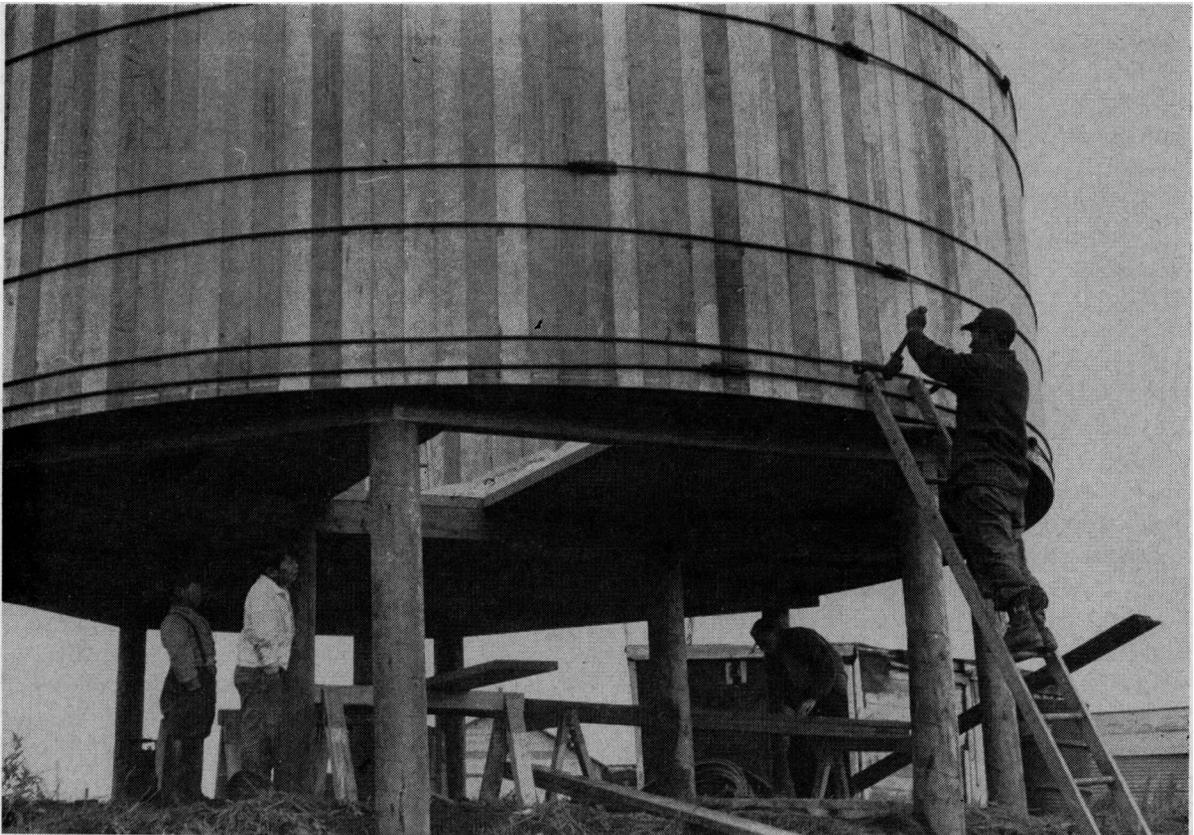
Throughout much of the State the mosquitoes (Culicidae) are considered the worst pest. In the forested regions the *Anopheles* and *Culiseta* females emerge from hibernation and begin to bite even before the snow has entirely disappeared. Biting increases as the *Aedes* matures, and the peak of the biting season is reached by mid-July.

Twenty-eight species of mosquitoes occur in Alaska, of which 10 are major pests, responsible for most of the biting. All Alaskan mosquitoes produce but one generation a year. They breed in stagnant water, and Alaska is well suited for them, with its vast expanses of boggy tundra, coastal marshes, swampy valleys, and upland bogs.

In some localities the black flies (Simuliidae) are considered worse pests than the mosquitoes. Of the 42 species of black flies known in Alaska, 11 are vicious biters. Reaction to bites is usually pronounced, and swelling and itching last a week or more and can be temporarily disabling.

Black flies, or "white sox" as they are called locally, breed in running water and in all kinds of streams, from the smallest trickle to large rivers. In some streams the larvae and pupae are of considerable importance as fish food. Most species produce one generation a year.

In the Panhandle and in some mountainous localities in central Alaska, the snipe flies (Leptidae, *Symphoromyia*) are the major pests during July and August. Two species are known to occur in Alaska and both bite humans.



Beginning construction of experimental house at Eek (see center model, p. 906). Basic design patterned after circular wood stave water tank; circular shape minimizes effect of wind action and drifting snow.

The bite is decidedly painful, and since biting occurs in open areas in bright sunshine, snipe flies are particularly discouraging to outdoor activities.

The precise breeding place of snipe flies is unknown, but it is thought to be wet, peaty soil in the mountains near timberline.

In some coastal towns, and occasionally inland, the punkies (*Heleidae*, *Culicoides*) are the major outdoor pests. The biting season is from June through August, with July and early August the worst. At least six species are known to occur in Alaska and they all bite humans. The punkies breed in water or wet soil and along the coast in the intertidal mud where sedges are growing. The complete life history of only one species has been studied in Alaska, and it produces one generation a year.

In Alaska the horse flies (*Tabanidae*) are widespread, but they are usually slow to bite humans. About 30 species are known in the State and perhaps a third of them attack hu-

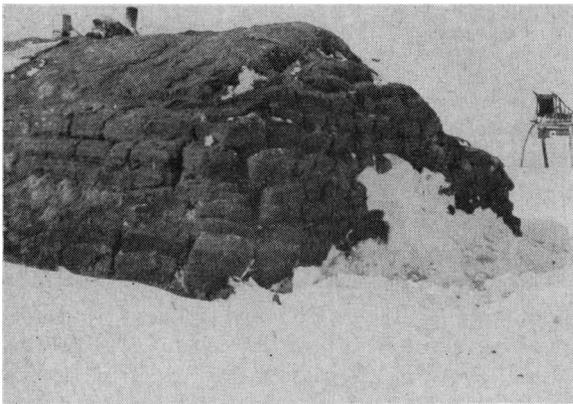


Completed experimental house at Eek. Entrance to living quarters is by stairs from below, to minimize heat loss. Enclosed space at ground level used for storage. Upper section (living quarters) insulated with plastic foam covered with exterior plywood; local grass used for insulation of lower section, covered with tar paper.

mans. Their chief importance is as pests of livestock and as possible transmitters of tularemia. They bite during bright sunshine when the temperature is high, around 70° F., during July and August. Tabanids usually breed in water or wet soil. Biological studies of these flies have not been made in Alaska.

Adulticiding with chemicals, mostly DDT, is the major insect control activity practiced in Alaska at present. It is expensive and gives only temporary relief but is used because the only biological information necessary is the flight and biting habits of the pest concerned. The insecticide is usually applied by airplane because few towns have the necessary roads for dispersal by ground mobile units. Stationary devices designed for dispersal of DDT aerosols and mists have proved fairly satisfactory for small installations such as camps, lodges, and homesites, but only when operated by trained personnel.

Larviciding provides more permanent control, and the biological information necessary for such an approach is now available to a large extent for the mosquitoes and to a lesser degree for the black flies and for one species of punkies. Biological information is entirely lacking for the snipe flies and horse flies. Also lacking are the trained personnel to make the preliminary habitat surveys required for effective larviciding. Black-fly ground larviciding should be done only by trained personnel because overdosage of chemicals would lead to disastrous results on fish spawning.



Sod-covered frame house, Point Hope. Note skylight and dog on roof.

Unfortunately, many of the most desirable permanent control measures, which do not involve chemicals, such as draining, filling, and flushing, are impracticable in Alaska because of the vastness of the breeding areas. Even in southeast Alaska, where the mosquito-breeding sites are limited by sea and mountains, dense undergrowth prevents the use of satisfactory control measures. But adulticiding and larviciding are economically feasible, especially in densely populated areas, when properly done.

Biting flies are a community problem—so also is their control. Community organization in the form of abatement districts, with trained personnel to perform the control operations, is needed for efficient control of these pests without risk to fish or wildlife, two of Alaska's important natural resources.

Food and Nutrition

Generalizations as to dietary practices and nutrition in Alaska are impractical because local circumstances alter custom. Actual food intakes, in any locality, are determined by cost, availability, and individual preference, usually in that order. Where direct transportation from the "southern 48" is available, cost is the controlling factor in dietary practices. In remote areas, availability dictates the diet.

Since the bulk of Alaska's food supply is imported, the resultant high cost of various items has a direct bearing on the dietary habits of almost all Alaskans, for few families nowadays, however remotely located, follow the old ways of gathering food from local sources exclusively. Overall consumption of fresh fruits and vegetables and whole fluid milk is below national averages, because a high proportion of these items must be imported.

Table 8 provides a comparison of current retail prices of selected food items in certain Alaskan cities with prices of these items in the United States and Seattle. All of the cities listed, except Nome, have direct access to surface routes, either water or highway, as well as air transportation the year round. Nome prices are therefore more typical of those found in outlying areas to which food supplies must generally be reshipped by air from the major transportation centers.

Table 8. Average retail prices of selected food items in five Alaskan cities, compared with Seattle and United States, March 1960¹

Food item	Unit	U.S. average	Seattle	Ketchikan	Juneau	Anchorage	Fairbanks	Nome
Flour.....	5 lb.	\$0. 55	\$0. 58	\$0. 72	\$0. 78	\$0. 80	\$0. 94	\$0. 94
Bread.....	1½ lb.	. 30	. 35	. 42	. 46	. 47	. 48	. 55
Ground beef.....	1 lb.	. 52	. 49	. 69	. 64	. 64	. 82	. 90
Milk.....	Quart	. 25	. 23	. 36	. 35	. 40	. 48	. 73
Milk (evaporated).....	14½ oz.	. 16	. 16	. 18	. 18	. 20	. 22	. 23
Orange juice (frozen).....	6 oz.	. 23	. 24	. 30	. 28	. 31	. 41	. 49
Oranges.....	1 lb.	. 21	. 25	. 22	. 28	. 26	. 26	. 47
Lettuce.....	1 lb.	. 20	. 17	. 28	. 32	. 32	. 44	. 61
Eggs (large grade A).....	Dozen	. 48	. 56	. 60	. 56	. 58	. 78	1. 06
Butter.....	1 lb.	. 74	. 75	. 79	. 78	. 85	. 91	1. 11
Total price of 40 "market basket" items.....		\$15. 75	\$16. 64	\$19. 48	\$20. 17	\$21. 16	\$24. 80	\$28. 37
Percentage of Seattle prices.....		95	100	117	121	127	149	170

¹ See reference 15.

Although dairy and poultry farming are leading sources of income among Alaskan farmers, high local production costs keep retail prices of these items in local markets high. Thus, Alaska-produced eggs must compete with lower priced eggs imported by air, highway, or water. Fresh grade A jumbo eggs produced in the nearby Matanuska Valley, for example, are currently selling in Anchorage markets for \$1.09 a dozen, while some Anchorage grocers are advertising specials of imported grade AA medium eggs for 49 cents a dozen.

Truck farming in Alaska is increasing steadily, and locally grown vegetables appear seasonally in local markets and at roadside stands in increasing quantities each year. Here again, however, local produce is not yet grown in quantities sufficient to compete in price with the volume imported by wholesale firms. Nor, of course, can local producers compete on a year-round basis.

Some newcomers to Alaska still regard Alaska-grown vegetables with some suspicion, apparently assuming that jumbo size and rapid growth must mean a tough, unpalatable product. Actually, Alaska's vegetables, harvested in their prime, possess superior palatability. Most of the crops, because of their rapid growth, are harvested while still relatively young and tender. Salad crops, for example, are sometimes marketed when no more than 4 weeks old.

In general, the non-native in Alaska eats as

well as his "southern" neighbor, if at greater expense. Unless his fixed expenses for items such as housing, utilities, and clothing demand a disproportionately large share of his income, his diet is generally adequate.

The diet of the Alaskan Eskimo and Indian is undergoing marked changes. The entire native population is going through a rapid cultural transition, and many have abandoned the life of the nomad hunter to work for wages. Unfortunately the time for wage work, usually seasonal in Alaska, coincides with the time when native food-gathering activities would normally occur.

Many natives have developed a liking for "white man's foods," often, unfortunately, for the less nutritious items. They have become particularly fond of coffee, tea, candy, pop, chewing gum, especially bubble gum, macaroni, "store" bread, and prepared cake and other mixes. Whereas formerly the bulk of their diets consisted of fish, often eaten whole, or meat eaten raw or partially cooked, they are substituting processed or canned foods whenever cash income will permit.

According to laboratory analyses, many of the native foods, now being abandoned, are of high nutritive quality. The most important natural Alaskan sources of vitamin A are animal livers, sea mammal oils, and wild edible greens. The fresh wild greens are excellent sources of ascorbic acid, as are cloudberry and some of

the fresh seaweeds. A mere 100 grams of seaweed is equal in ascorbic acid content to a medium-sized orange. Good iron sources are available from both land and sea mammal livers, wildfowl, wild edible greens, blackfish and needlefish, especially the latter two, since the Eskimo eats the entire fish, including the entrails. Clams, blackfish and needlefish, willow leaves, and certain seaweeds (*Alaria*, *Laminaria*, and *Agaricum*) are rich in calcium.

The supplemental feeding program in the Bureau of Indian Affairs schools has influenced eating habits in some villages. Many of the foods served at school as hot breakfasts, lunches, or "snacks", have become favorites with the children. Teachers try to use these supplemental feedings as learning situations. Village women sometimes help with the lunch program, thus affording additional opportunity for nutrition education.

During the past few years, increased welfare allowances under the aid to dependent children and old-age assistance programs have made regular purchase of store foods possible. In many instances considerably more guidance in wise purchasing and economical use of purchased foods is needed. The village store or trading post usually constitutes the main source of supply, although some individuals and families have adopted the practice of ordering food supplies by airmail order or charge account from the nearest city. The village trader usually stocks his shelves according to local demands, and itinerant health personnel frequently suggest to him the stocking and promoting of certain items, such as powdered milk, as a means of encouraging greater as well as more economical use of milk.

Food intakes among native groups in Alaska vary according to location as well as income. While seasonal shortages in the natural food supply occur occasionally in all parts of Alaska, they are usually more severe and more frequent in the tundra areas than in coastal villages.

The trend toward larger and permanently located villages also influences food supply. Populations of some villages are increasing, largely as a result of decreasing mortality rates. In other villages, establishment of permanent schools and post offices has attracted new residents from surrounding communities. Natural

food supplies around these growing villages are dwindling as the hunters and trappers tend to confine their food-gathering activities to a smaller radius.

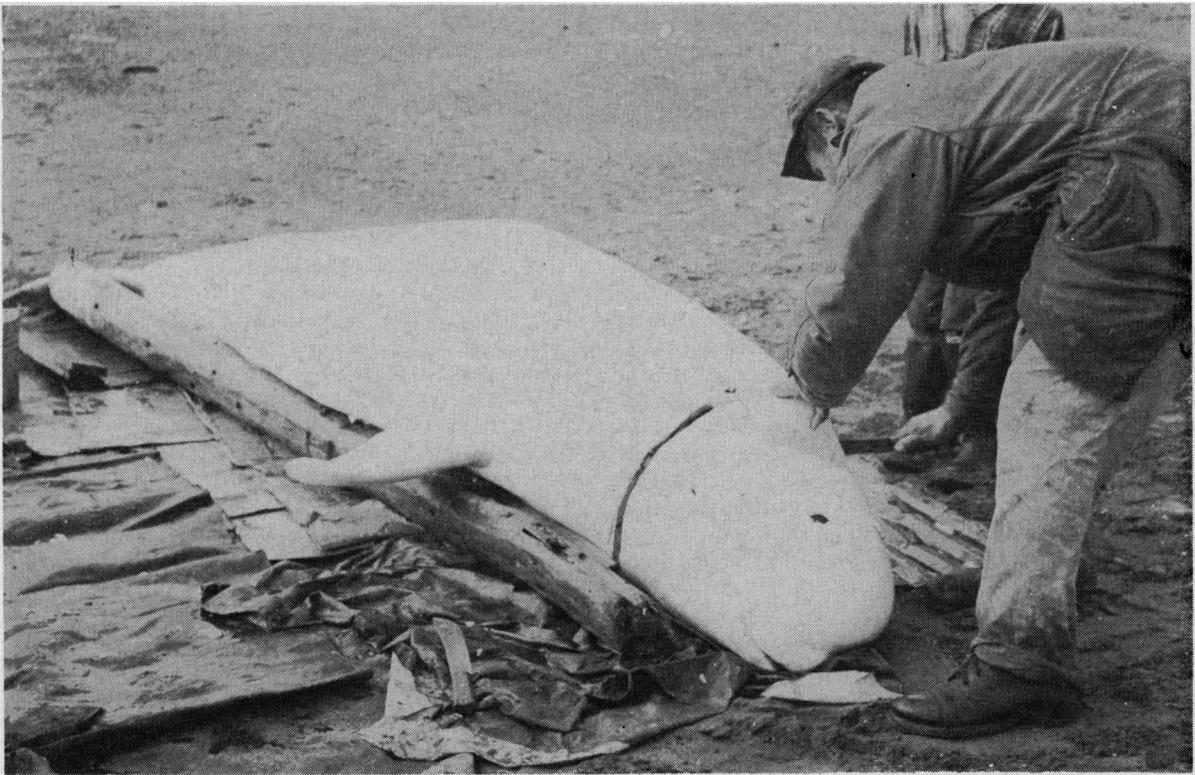
From the standpoint of changed feeding practices, the nutrition of the infant and preschool child is probably in the most precarious situation. Whereas in earlier days the Eskimo mother breast fed her baby for at least 2 years or longer, the practice of bottle feeding, learned during periods of hospitalization for tuberculosis or through other contacts, has been widely adopted. While the small infant on the bottle generally receives a formula of half evaporated milk and half water and is fed on demand, toward the end of the first year the proportion of milk to water is often drastically reduced.

The idea of supplemental feedings for the bottle-fed baby is slowly being adopted. In some villages health and medical personnel have succeeded in influencing village councils to provide, at village expense, suitable vitamin preparations for all mothers with small infants. School-age children have been receiving multivitamin pills in conjunction with the Bureau of Indian Affairs school lunch program for the past several years. Multivitamin pills also have been distributed to participants in the tuberculosis chemotherapy program. To date, however, the toddler and the preschool child have not generally been included in these programs.

In spite of the numerous nutritional hazards noted, a recent survey (16) has revealed that specific nutritional deficiencies are not a health problem among adult Eskimos and Indians at this time. Despite low intakes of certain nutrients, little clinical evidence of deficiencies was discovered.

Study of dietary records collected seasonally, in conjunction with the above survey, from nine Eskimo and two Indian villages over a period of 2½ years has afforded much valuable information. The following comments are based on preliminary analyses of some of the survey findings.

Except during food shortages the protein intake of Eskimos and Indians is more than adequate. Intakes of carbohydrate, fat, vitamin A, thiamin, riboflavin, niacin, and iron vary widely among residents of the villages under



Preparing to butcher a beluga, or white whale, favorite meat of Eskimos along the northwest coast of Alaska and the lower Yukon River. Rack under whale represents forward step in sanitary handling of food. Formerly butchering table was the beach itself, often littered with soil from both dogs and humans.

study. Dietary intakes in some villages show obvious nutritive shortages when compared with allowances recommended by the National Research Council. Notable among these shortages are iron, in the tundra villages where the main source of protein and iron is fish, vitamin A, and ascorbic acid. Calories from fat make up from 22 percent to more than 50 percent of the total calories; the total calorie intake is often well below that recommended by the National Research Council for comparable age groups.

Outlook

Alaska has made considerable progress against great odds in the field of health and medical care in the last 20 years. The outlook for continued health progress in the 49th State is promising, but so many contingencies are involved that predictions can be little more than arbitrary conjectures.

Alaska has abundant resources, sufficient to support a much larger population, but needs more capital and more people to develop these resources.

It seems likely that Alaska's present major health problems—those stemming from infectious diseases and inadequate sanitation—will continue to claim priority for some time. Most of these problems could be reduced materially with sufficient health personnel and facilities for service, education, and research. Much of Alaska's past progress in overcoming major health problems can be attributed to strong Federal support and increasing Territorial-State appropriations.

Alaska also needs a larger and more stable population for development of potential leaders in the health professions. The interest and intent to develop training facilities for medical and paramedical personnel within the State are already evident.

Alaska's greatest resource is people. The

determination and willingness of Alaskans to attack seemingly insurmountable problems have been amply demonstrated. Given an adequate financial base and wise leadership, the 49th State should be well able to sustain and expand present health services and facilities to meet increasing and emerging demands.

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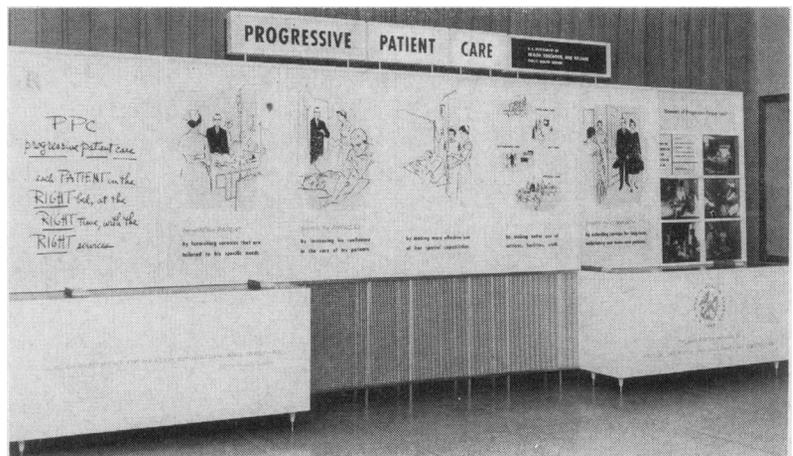
exhibits

Progressive Patient Care

Progressive patient care, the concept of tailoring medical services to meet the patient's needs, is the subject of an explanatory pamphlet and exhibit developed by the Division of Hospital and Medical Facilities, Public Health Service.

The five elements of patient care encompassed by PPC, as the plan is called, are explained as intensive, intermediate, self- and long-term care within the hospital, and home care.

Benefits are described as services tailored to the patient's needs, increased confidence by physicians in the care received by their patients, more effective use of the nursing staff, better use of hospital services, facilities, and staff, and extended services to the community for long-



Specifications: A 7-panel exhibit, 18 feet long, 7 feet 6 inches high, and 2 feet deep; total weight about 1,300 lbs., including the 4 packing crates. Literature may be displayed on the top of the cabinets at each end. One 500-watt and one 250-watt electrical connections are required.

term ambulatory and home care patients.

The exhibit is available for loan without charge, exclusive of shipping charges.

Further information, including ar-

rangements for borrowing, can be obtained from the Division of Hospital and Medical Facilities, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.